The Chemical Age

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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TNT Production

THE second of the special series of reports which are being published in order to make available, for the benefit of the industries concerned, results of scientific and industrial value contained in the technical records of the Department of Explosives Supply of the Ministry of Munitions deals with the manufacture of trinitrotoluene (TNT) and its intermediate products. The information contained in the reports is the result of the labours of the Ministry of Munitions, and is being compiled by Mr. W. Macnab, an officer of that Ministry now attached to the Department of Scientific and Industrial Research. The present report is obtainable at H.M. Stationery Office, Imperial House, Kingsway, W.C.2. Apart from a reference to the analyses of the mixed nitric and sulphuric acids used for nitration purposes, no mention is made in this report of the actual mixing process or of the general acid-cycle in use. It is intended that this subject shall be dealt with in a separate publication which will include descriptions of acid-cycles required in the production of TNT, nitro-cellulose, and nitro-glycerine; SO_3 and water balances; plant and process for mixing acids, etc. In the present work the description of plant and process is made throughout as full as possible, but in one or two instances information is withheld for obvious reasons.

In the chapter dealing with "History of Manufacture," it is explained that TNT was not a Service explosive until the beginning of the war. It had been tried experimentally at Woolwich, but was manufactured only in small quantities chiefly as a minor by-product of the dye industry. The manufacture was carried out under conditions which gave very poor yields and were inconvenient for production on a large scale. It was, therefore, necessary to build up a manufacture practically from first principles and to ascertain conditions which would give the highest possible yields in order that the available supplies of toluene might be utilised to the best advantage. To some extent the nitro-glycerine process was taken as a precedent, and the manufacturing methods which had proved useful in this connexion were tried in the preparation of TNT, but on the whole the precedent did not prove very useful. It was found that the displacement process which had been of great value for nitro-glycerine was not nearly so successful for the manufacture of TNT and de-acidification by means of alkali, which works successfully in the case of nitro-glycerine, is useless in the washing of TNT, as the molten TNT is strongly attacked by the alkali.

The Research Department at Woolwich undertook to work out the conditions for the preparation of TNT without oleum, which was at that time extremely scarce. Some hundreds of nitrations established the best conditions of nitration, and the conditions thus arrived at were further tested in a small experimental plant with a capacity of about $\frac{1}{4}$ ton of TNT. When the methods described in previous publications were tried, they were found to give unsatisfactory yields, part of the toluene being oxidised by the nitric acid, forming large quantities of nitrous fumes. The conditions for avoiding this oxidation were, however, soon learnt, and it became possible to lay down a scheme of nitration which converted toluene to TNT with comparatively little waste, and with a minimum of oxidation and formation of nitrous fumes. The main points in which the Woolwich reports recorded an advance on previous knowledge were (1) the importance of certain conditions of temperature during the nitration which had not been previously recognised, (2) the extraction of the residual acids from the trinitration stage by means of mononitrotoluene (afterwards called detoluation), and (3) an elaboration of the counter-current system of nitration in such a way as to utilise the acids to the best advantage.

Plant and Process

In the second chapter of this work a very full description is given of the plant at H.M. Factory, Queen's Ferry, which was designed originally for the nitration of toluene to TNT in two stages. The first stage consisted of a mononitration, using toluene-petrol or coal-tar toluene as the starting material. Mononitrotoluene (MNT) was prepared from toluene-petrol by nitration, followed by washing and distillation to separate the unchanged petrol. In the manufacture of MNT from coal-tar toluene, however, the operations of washing and distilling the nitrated product were unnecessary, and the latter underwent no further treatment before being used in the trinitration process. The MNT prepared from toluene-petrol was known as "pure" MNT (the term "pure" referring only to the purification which the nitration product underwent during the washing and distillation stages), and that produced from coal-tar toluene as "unwashed" MNT. The MNT from either of these sources was then used for TNT manufacture, being first employed to wash the waste acid resulting from the trinitration stage. This operation is known as "detoluation." Its effect is to extract the dissolved TNT, to utilise any residual nitric acid by nitrating some of the MNT to dinitrotoluene, and to leave the acid clear and suitable for denitration and concentration. The solution of mononitrotoluene containing TNT and dinitrotoluene (under the name "acid-MNT") was then used for trinitration.

The second stage consisted of the nitration of the "acid-MNT" to TNT in one operation, using a mixed acid of low water content. Thus, in the original Queen's Ferry practice, the detoluation process was introduced essentially as a washing stage, and not as a nitration stage, the only nitration effected being that resulting from the HNO_3 content (approximately 2·5 per cent.) of the waste acid from the trinitration. The acid leaving the detoluators ("spent acid") had the average composition :—

	Per cent.
H_2SO_4	72·0
HNO_3	trace
HNO_2	3·5
Soluble in ether	0·7
H_2O	23·8
	100·0
Specific gravity	1·660

The acid-MNT resulting from this detoluation process had a gravity of 1·25-1·30/25°C., and consisted mainly of MNT, with comparatively small quantities of TNT and dinitrotoluene. The nitro-body content of the spent acid, given above as 0·7 per cent., was almost entirely in the form of mononitrotoluene, and no difficulty was experienced in pumping acid of this composition through blockage of delivery pipes due to solidified nitro-compounds.

As the urgent need for strict economy in the usage of nitric acid became more and more apparent, the effort to recover as completely as possible the oxides of nitrogen liberated during the nitration processes resulted in the installation of very efficient absorption systems, with the result that considerable quantities of weak nitric acid (containing 50-55 per cent. HNO_3) were recovered. In addition to the above, large quantities of weak acid were available from other sources in the factory, and, as this acid could not be disposed of conveniently in any other way, it was decided to utilise it in the detoluation process, making the latter to all intents and purposes a dinitration stage. In its final form the detoluation process was so arranged that the acid-MNT resulting from it (or DNT, as it was then called) had a specific gravity of approximately 1·35, corresponding to a high content of dinitrotoluene. The advantages resulting from the extra nitration in the detoluators were obvious; at the same time the primary object of detoluation was no longer attained, viz., the production of a spent acid of low nitro-body content, since the increased solubility in sulphuric acid of the nitro-compounds (due to the presence of more dinitrotoluene) raised this content to considerably over 1 per cent. This resulted in large quantities of valuable organic material being transferred in the spent acid to the Acids Section of the factory, thereby causing much inconvenience at the denitration and concentration plants. In order to overcome this difficulty, additional plant was installed in order to wash the acid leaving the detoluators with MNT, and as this process actually took the place of the original detoluation scheme, it was known under the name "super-detoluation."

Manufacturer and Merchant

In the chemical trade, and especially in the dyestuffs section of it, much has been heard of late as to the relations of manufacturers and merchants, and particularly as to the exclusive policy adopted by some of the former class with a view to eliminating the latter. On this rather delicate subject, Mr. W. G. Wickham, one of our senior trade commissioners, and one of our most lucid and observant writers on overseas trade organisation, has been expressing in *The Board of Trade Journal* opinions which well deserve attention. British manufacturers, he says, in studying the causes of the advance of foreign trade in their overseas markets, came to the conclusion that many merchants had become too cosmopolitan in their business, and that they had largely assisted in introducing and entrenching foreign competition. Having reached this point, nothing seemed easier for the manufacturer than to dispense with the merchant altogether, and appoint his own travelling representative. Here, however, he failed, in Mr. Wickham's judgment, to realise the essential facts of the case. Manufacturers, he states, have been misled into abuse of the merchant as a parasite. "They have fallen into the error, which may equally be found in labour circles and among farmers' co-operative societies, of claiming that their own work was their only work. The manual labourer considers, as does the farmer, that production ends when his work is finished, and that all the brain work and clerical work involved in distribution is a mere nothing, for which almost any pay at all is over-payment."

From this our author proceeds to instruct the manufacturer in some elementary principles of trade. The value of a product, he points out, depends largely on distribution. A perfectly worthless article, such as some patent medicine, finds a market through scientific distribution. An utterly inefficient system of distribution may equally ensure the failure to sell a product which would be of great value. Manufacturers

are told plainly that if they had been more generally ready to study the work and methods of merchants before they decided to dispense with their services they would have realised that "*all* middlemen are not parasites"—meaning, of course, that not all middlemen are parasites—and that "many are not only an economy but essential to efficiency." The result is that, in appointing travelling representatives, they have merely substituted one type of middleman for another.

The lesson does not end here. From the facts within his wide experience, Mr. Wickham infers that many manufacturers have failed to learn that distribution is a science needing as much patient study and continuous application as manufacture; that skill in distribution is at least as important as in manufacture; and that such skill must be paid for equally. "All these matters" Mr. Wickham concludes, "were in the past made subjects of special study by merchants, and, unfortunately for such manufacturers who desire to dispense wth their services, the knowledge acquired has never been dealt with in text-books. Apart from small subsections of the science, there is no literature of oversea distribution. The many British manufacturers who have successfully built up their own system of oversea distribution have had to learn by experience as merchants did before them. They have learnt that scientific distribution involves much study, judgment and hard work; that while possibly the system of relying entirely on merchants for export markets was unsatisfactory, nevertheless to undertake distribution and eliminate the merchant involved more rather than less work than the merchant had hitherto done."

A Settlement

THE announcement on Monday last that the wages dispute in the chemical trade had been settled came as a great relief to all concerned, for the economic difficulties which confront the industry are quite sufficient without being added to by labour troubles. As usual in such cases the settlement takes the form of a compromise. The employers' proposal to reduce wages by 2d. an hour is somewhat modified; under the settlement the men accept a reduction of 1½d. an hour to date from August 1, with a further reduction of ½d. from October 1. After that wages will be stabilised until December 31. The men, of course—at any rate their leaders—express dissatisfaction with the result, but their acceptance indicates their recognition of the fact that the terms save them and the industry as a whole from a very much worse alternative—the closing of works and irretrievable damage to British industry.

The British Association

THE critics have already got to work on the British Association which meets in Edinburgh next, week and it seems quite probable that the aftermath that succeeded the Cardiff meeting may reappear this year. It is the British way to emphasise defects and to ignore the really great results, just as we talked very little of our production of an army of five millions, taking this as a matter of course, but made no end of fuss if a pair of socks got lost in the post or a pension allowance was paid twice or not at all. From the chemical side at any rate this year's meetings promise some excellent features. Sir Edward Thorpe's presidential address on "Some Aspects and Problems of Post-War Science, Pure and Applied," is sure to be worth hearing, and that of Dr. M. O. Forster, the president of the Chemistry Section, on "The Laboratory of the Living Organism," instead of being a mere treatise on digestion or a complete cure for dyspepsia, as some unimaginative people seem to assume, will more probably prove an intensely modern and stimulating utterance on a new and fascinating field for chemical research. The other chemical contributions will include papers on "The Genesis of Plant Pigments and Related Substances," by Professor R. Robinson, "The modern Dyestuff Industry," by Professor H. S. Fierz, "The Structure of Molecules," by Dr. Irvine Langmuir, and several others.

The End of the War

BY an Order in Council the war, which began on August 4, 1914, terminated at midnight on Wednesday, and for the purposes of all statutes, deeds, contracts, and legal instruments, the war is deemed to have terminated on that date. All this sounds very impressive, but nobody quite knows exactly what it means or what liberties are thus suddenly restored to us. As a matter of fact some of the regulations which would have officially ceased under this Order are already embodied in other Acts. For instance, the regulations as to the importation and carrying of firearms and the possession of cocaine, morphia, or opium may be instanced as appearing in another guise in the Firearms and Dangerous Drugs Act. The Defence of the Realm Act, we may take it, finally disappears, though one must not be surprised if some of its regulations unexpectedly reappear to disappoint our hopes of freedom. It was understood that all restrictions on export would disappear from the termination of the war, but most of these have already gone, and we can count on the resources of the Board of Trade to reimpose, with the aid of the Attorney-General, any that they desire to revive. Anyhow, whether it means much or little, it is some relief to learn that peace is now a legal as well as an actual fact.

The Calendar

Sept. 5–6	Iron and Steel Institute: Autumn Meeting.	Comité des Forges de France, 7, Rue de Madrid, Paris.
6–10	American Chemical Society and Society of Chemical Industry.	New York.
7–14	British Association for the Advancement of Science: 89th Meeting. Presidential Address by Sir Edward Thorpe.	Edinburgh.
12–17	Seventh National Exposition of Chemical Industries.	New York.
Sept. 19–Oct. 29	Royal Photographic Society of Great Britain: 66th Annual Exhibition.	35, Russell Square, London.
Sept. 21–23	Institute of Metals: Annual Meeting	Birmingham.

Book Received

CHEMISTRY AND CIVILISATION. By Allerton S. Cushman. Edinburgh: E. & S. Livingstone, pp. 151. 15s. net.

TECHNICAL RECORDS OF EXPLOSIVES SUPPLY, 1915-1918. London: H.M. Stationery Office. Pp. 116. 17s. 6d. net.

Society of Chemical Industry

President's Address to the Annual Meeting at Montreal

We give below the text of Sir William Pope's presidential address to the Annual Meeting of the Society of Chemical Industry at Montreal on Monday, August 29.

THIS is the first occasion on which the annual meeting of the Society of Chemical Industry has been held in the Dominion of Canada. There is something peculiarly appropriate at the present time in the inauguration of what I trust will prove an endless series of such meetings outside the British Isles. Our nation has but recently emerged victorious from the greatest war in the history of mankind; we feel that one of the most wonderful circumstances of that struggle—the one, perhaps, which will appeal more strongly than any other to the imagination of historians in centuries to come—is the unanimity with which all the multitudinous races included within the British Empire responded to his Majesty's call and poured out blood and treasure unstintingly in the common cause. The war proved that our Empire is no loosely-connected aggregate of countries, but represents a single vast community of men and women; the smaller interests of districts or of people are indeed not identical, but we all share the one main interest—namely, that of the welfare and the progress of the Empire to which we belong.

The Society of Chemical Industry stands out from amongst the majority of scientific and technical associations in being an Imperial society; its activities are not limited to the small confines of the mother islands, but we have vigorous and prosperous sections in many parts of the Empire. It is even more than an Imperial society, in that it has a powerful section in the United States; we can justly claim to represent not only the British Empire, but also the whole Anglo-Saxon race in matters of chemical technology, for we have large bodies of members wherever the English tongue is spoken.

Finance and Organisation

The wide field covered by our society makes it all-important that its many sections should be managed energetically, and should represent each an active body of members intent on the advancement of our subject; this is especially true just now, when the scientific, industrial and commercial activities of the whole world are undergoing reconstruction.

It is unnecessary for me to enlarge on this theme before an audience composed mainly of our Canadian members; you have already acted upon it, and the Canadian organisation now consists of five sections of the Society of Chemical Industry. The advantages of the new system of working are obvious, and we look forward with confidence to seeing their effect in increased numbers of papers on original work in our *Transactions*. In connexion with your reorganisation attention may perhaps be directed to one point. Great efforts are now being made by our Council and Publications Committee so to alter the character of our *Review* as to make it more readable and of more general interest; most of us are anxious to be kept fully informed upon the doings of our members, and it is particularly difficult to collect information concerning those who are far from headquarters. If in organising your sections you can arrange to provide the editors with prompt information on matters of interest, you will do the Society a great service.

[Photo by courtesy of the Canadian Pacific Railway Co.

GENERAL VIEW OF MONTREAL TAKEN FROM MOUNT ROYAL.

Two years ago the financial position of the Society was causing the Council grave apprehension; to-day, I am happy to say, our greatest anxieties concerning finance have vanished, and you will have seen from the balance-sheet that whilst economy is still necessary, the need for parsimonious conduct of the *Journal* no longer exists. In this connexion, mention should be made of the munificent bequest to the Society by the late Dr. Rudolph Messel, one of our former Presidents, and one of the most devoted promoters of the Society's objects. The capital value of the bequest is in the neighbourhood of £20,000, and consideration is being given to the question of how best to apply the income to advantage; meanwhile, it has been decided to perpetuate the memory of our late friend

by the establishment of a medal and a memorial lecture to bear his name.

Seven years ago the situation and the outlook in all branches of scientific industry were very different from those which now confront us.

In 1914 certain of the chemical industries of Great Britain were expanding slowly but steadily, whilst others were slowly, but just as surely, shrinking before foreign competition; in some of the chemical industries Great Britain was supreme, but in others we were losing ground. At that date, chemical industry was expanding rapidly in this great Dominion, and all the virility of a growing population was being devoted to the utilisation of the vast natural resources of a previously but partly developed country.

From War to Peace

The interval has seen the commencement and the conclusion of a great conflict, a war which has reduced to mediocrity several of the dominant European Powers, and has left nearly every nation struggling under an accumulation of debt. Throughout the war the Dominion, like every component of the British Empire, devoted itself actively to the production of foodstuffs and of munitions of war; although the great majority of the valid manhood of all countries entered active service, we were successful in establishing on a grand scale the manufacture of the many and varied chemical products required for military purposes. One of the vast problems which the war has bequeathed to us is that of determining how the faculty which we exhibited in the manufacture of chemical products during a period of emergency is to be diverted and utilised for peace purposes, and for meeting the normal requirements of the world's commerce.

The problem is an entirely novel one, in that it is accompanied by certain factors which were previously absent, or which were at any rate of subsidiary importance. Thus, it cannot be doubted that the bonds uniting all parts of the British Empire have become far stronger in consequence of the events of recent years; further, we realise to a greater extent than ever before that, for purposes of production, our Empire must be, if not absolutely self-contained, at least in possession of modes which could be rapidly mobilised so as to render us self-contained. Before the war, we were dependent on Germany for bromine and for coal-tar colours and upon the Dutch colonies for quinine; the price of these and other essential products quickly rose to famine prices, although no reason exists why they should not be produced within the Empire just as conveniently and just as cheaply as abroad.

So completely has the necessity for a British production of great numbers of chemical products been brought home, even to the man in the street, that action has been taken in order to remove the former disabilities; the extent to which success has attended these efforts is open to comment, but it is at least certain that if we ever again find ourselves in a position of embarrassment owing to the absence of British sources of supply of essential chemical products, our political leaders will have to exhibit considerable agility in shifting the blame on to other shoulders than their own. All the bromine we require could be obtained as a result of the introduction of rational chemical methods into the production of salt from sea-water in India; all the quinine required could be furnished cheaply by the scientific cultivation of cinchona in our colonies; and the British production of complex organic explosive materials during the war has entirely swept away the ancient propagandist doctrine that the manufacture of fine organic chemicals, including coal-tar dyestuffs, is incompatible with the British temperament.

Too Slavish Imitation of Germany

All these are matters of great importance; but one further consideration has become accentuated during recent years, and accentuated by the fact that the major portions of the tropical regions of the world are administered by the English-speaking and the Latin nations. In the past we have, I venture to think, endeavoured to build up our chemical industries far too much on the lines which proved so fruitful in Germany. I am speaking now not of the heavy chemical industry, in which we have always been to the fore, but of those industries which involve the production or the use of a great variety of more or less complex organic compounds. The organic chemist has long had before him, as one great object of his work, the artificial production of the myriads of organic compounds which we find amongst animal and vegetable products; he may be justly proud of his achievements in this direction, and the success attained justifies our belief that we shall within quite a short time be able to prepare in the laboratory any compound substance formed by the animal or plant. Immediately some important natural product of commercial value is produced in the laboratory, the German technologist has sought to convert the laboratory method into a works process capable of competing with that of the plant or animal. From the standpoint of the German economist this course of action was sound; Germany had but few colonies, and those few, since the German Government did not possess the art of colonial administration, were a source of considerable expense to the fatherland. We have relieved Germany of this expense, and have probably thereby given a stimulus to the German instinct for making in a chemical works those chemical products given to us by tropical nature.

My point in suggesting that we have erred in adopting German views concerning the methods and aims of chemical technology, without reflecting that economic conditions in Central Europe are entirely different from those which prevail in the British Empire regarded as a whole, perhaps calls for some explanation; the necessary elucidation may be furnished by considering the ultimate object of technical chemical effort. The object of all technology consists in converting raw materials of inorganic or organic origin into products of greater value by expending upon them a certain amount of labour and a certain amount of energy. To a Central European nation labour means high wages to its population, and energy means mainly coal or water-power; only one type of technological process is thus in the main to be considered, and this is one in which certain raw materials enter the works to be handled by costly labour and to be treated by the burning of fuel, which is another form of costly labour.

The Case of Synthetic Rubber

We have other methods for obtaining similar results, methods which are available in many cases but have been worked out in only a few cases. Let us consider one specific example. During the war, Germany was successful in producing india-rubber in her chemical works; as converting into a works process the method for the polymerisation of a hydrocarbon of low molecular weight to give rubber, discovered as a laboratory operation by Tilden and Bouchardat many years ago, this was a fine achievement; but there is no doubt that the costs of production were high. When we consider, however, that many of the rubber plantations are in British territory, that curtailment of output has been necessary to keep last year's production down to about 350,000 tons—all the world could absorb—and that the cost of production was in the neighbourhood of 25 cents per pound, it will be realised that the British Empire has a technical method for producing rubber which is a far sounder business proposition than the German synthetic processes. Our raw materials result from rubber plantations, the establishment of which is not costly, the labour employed is cheap tropical labour, and the energy utilised is that of the sun's heat, which does not require to be mined and transported on railway trucks. Since the world's annual consumption of rubber will certainly increase rapidly, and since our rubber plantations can already produce more than the world's present requirements, it is clear that we are in possession of a process for making indiarubber, using cheap labour and gratuitous energy, which if conducted on scientific lines will always defy competition from the chemical works of Central Europe.

Nature the Source of Future Supplies

It would not be fair to deprecate the installation of synthetic methods for manufacturing complex natural products. Nature in general furnishes us with but one very complex member of any particular class of organic compounds. Thus, the numerous plants which produce indigo yield but minute proportions of other compounds of a similar type, and in this instance the chemical technologist has succeeded in manufacturing a whole range of valuable dyestuffs of the indigo family which do not occur among vegetable products; his efforts have to this extent been amply justified, but it is difficult to believe that synthetic indigo itself would ever have been able to compete in the market if a similar amount of scientific skill and intelligence had been devoted to the improvement of the cultivation and utilisation of the indigo plant. The work

which is now being done by Armstrong, Davis and others on natural indigo may well result in the re-establishment of the Indian indigo plantations, which many decades ago brought such a substantial contribution to the financial prosperity of our Empire.

Other similar examples are available. During the Russo-Japanese war large quantities of camphor were manufactured in the German chemical works, but this production was killed so soon as the Japanese camphor laurel started to produce after the war.

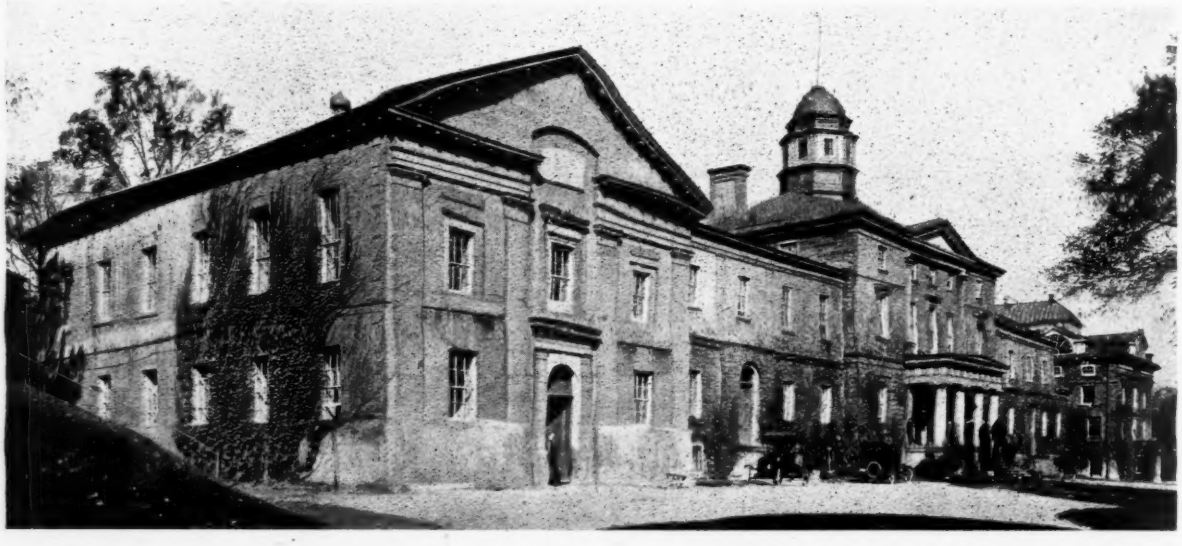
The wider recognition of the fact that chemical technology largely neglects what perhaps should be regarded as its most important mode of operation may, at no distant time, be forced upon us as an entirely economic necessity. The densely populated temperate regions of our globe will demand for their consumption and dissipation ever increasing quantities of energy, and the sources of energy in those regions—coal, oil, water-power, etc.—are diminishing rapidly. We shall be forced to set up a scheme for transporting to our northern countries the energy so lavishly sent from the sun to tropical lands. It is by no means impossible that the day may soon come when vegetable oils, produced in the tropics, will be brought northwards for use as an economical form of fuel. With these considerations in view, it seems time for our chemical technologists to devote more attention than they have heretofore to practicable methods for utilising the surplus energy of the tropics in supplementing the waning supplies of energy available in colder climates.

The Eve of a New Chemical Epoch

Another aspect of this question forces itself upon us. The last century has witnessed two great phases in the development of practical chemical work. Roughly speaking, it may be said that the progress of chemistry up to about forty years ago, great though the progress was, resulted from the application of rather fierce methods; a time came, however, when it was recognised that much was to be learnt, especially in organic chemistry, by the study of delicately balanced reactions in which the practical methods applied were devoid of violence and in which conditions, such as concentrations, temperatures, and the like, were carefully controlled. The organic chemistry of to-day does not distil fragile organic compounds through red-hot tubes; it proceeds by more subtle methods which, nevertheless, have greatly developed the broad knowledge of the science bequeathed to us by our predecessors. In its adoption of milder modes of operating and its consequent application of energy at a low potential, organic chemistry is approximating in its laboratory methods to those which occur in plants and animals; but the chemical changes which occur during the course of animal or vegetable life are still far more complex than those brought about in the laboratory. This complexity doubtless arises from the utilisation of low potential energy in the living organism; temperature changes of more than one degree Centigrade are not permissible in the healthy animal organism. The great majority of the chemical reactions which take place in living matter occur catalytically in colloidal media.

While the first great epoch in the history of organic chemistry was marked by the application of violent experimental methods, the second developed milder modes of procedure; the third epoch, which is in course of inauguration, will bring us into direct competition with the experimental chemical methods practised by living matter. It is impossible to doubt that a vast expansion of organic chemistry will be witnessed by many of us, an expansion which will result from an imitation of the gently effected chemical operations carried out in the animal and vegetable creation.

Whilst this prophecy is not a mere surmise as to the nature of the next step forward to be taken by the science of organic chemistry, but is rather of the nature of a logical deduction from past events, it is perhaps surprising that more use has not been made of the chemical methods of living matter for technological purposes. On a technical scale, the activities of living organisms have been harnessed in the production of alcohol, acetone, glycerol, and acetic and citric acids from sugars, and the pathologist has been wonderfully successful in directing similar activities towards the rectification of abnormal vital processes; much has also been done in the bacterial treatment of sewage and the separation thereby of valuable plant food-stuffs from the very dilute solution in which these occur in effluents. When the immense variety of chemical operations performed by living material is considered, it must be concluded that the manufacturing processes just mentioned, important though they are, are but a minute fraction of those which could be economically applied to the production of useful organic compounds if the scientific study of the subject had been sufficiently developed.



[Photo by Courtesy of the Canadian Pacific Railway Co.

THE MCGILL UNIVERSITY, MONTREAL, WHERE THE MEETINGS OF THE SOCIETY OF CHEMICAL INDUSTRY ARE BEING HELD.

Resources of the British Empire

This subject would seem to be of particular importance to the development of chemical technology in the British Empire, which includes within its domain every range of climate and every species of animal and vegetable life. If we were able to establish an organisation for the study of methods and processes for the manufacture by biochemical agencies of useful chemical products we should reap a rich harvest.

Apart from questions of the desirability of plant culture for the purpose of increasing the yield of valuable products and of the study of biochemical methods for manufacturing necessary chemical substances, both of which are of vital interest to us, although perhaps of more purely academic interest to other nations, another problem presents itself to us. A wide expanse of Empire brings with it exposure to a great variety of different types of parasitic life; these may be merely vegetable pests, like the prickly pear which is giving so much trouble in North Australia, or they may be such as cause diseases which render European life precarious in certain regions. The chemical technologist of to-morrow will need protection in the shape of methods for combating these ills, and up to the present far too little progress has been made in this direction. It is true that the prickly pear is destroyed by spraying with arsenic chloride; but this is a mass treatment which is expensive, dangerous, and only locally effective. It is true also that great success has been attained in the prevention of eradication of tropical diseases by inoculation with serum or by the injection of chemical materials. But notwithstanding the progress which has been made in these directions the whole subject involved is but in its infancy; and although British institutions for the study of tropical diseases and of parasitic plants have contributed much, in comparison with their means, it cannot be denied that Germany has also done splendid service by the study in its state-supported institutions of the very vital problems which arise. This source of scientific help will not be available in the future; it cannot be expected that a nation which only retains an academic interest in ills which no longer affect its own economy will preserve an active interest in fighting these tropical plagues. That the question is an urgent one—one which should interest our great manufacturers and merchants—finds illustration in the fact that over 90 per cent. of the inhabitants of the Fiji Islands and of Malaya are infected with hookworm; it would be difficult to estimate the extent to which production is limited by this plague in regions which are among the most fertile in the world.

The Scientific Study of Petroleums

All the foregoing are questions which will necessarily become urgent at some no distant date, and most of them will call for the breaking of more or less new ground by the chemical technologist. Of others which seem to have been long ripe for study I may mention one. Although we are in possession of very complete knowledge of the constituents of coal-tar, a very common raw material, and have developed an elaborately detailed scheme for utilising those constituents in the manufacture of valuable chemical products, no real effort has yet been made to deal in a similar manner with crude petroleums. It is common knowledge that crude petroleums are very complex mixtures of organic substances, just as is coal-tar, and also that a great variety of mineral oils are available in large quantities, each quite different from the others in the chemical nature of the hydro-carbons of which it mainly consists. No systematic attempt has yet been made to classify the various petroleums according to their chemical character, to separate from them pure chemical compounds and to endeavour to utilise these in the chemical industries. So far as petroleum is concerned our present attitude resembles that which we maintained a century ago towards coal-tar; it is regarded as only fit to burn. A vast field of chemical activity lies before us in the scientific study of petroleums and in the device of processes for utilising the valuable individual compounds which they certainly contain in the expansion of chemical industries.

I have ventured to lay before you to-day a few thoughts concerning the manner in which the changed conditions of the world are likely to influence the future trend of development of chemical technology. Since no one can doubt that conditions are changed, I presume that all will agree that chemical industries, which depend upon these conditions, will also change. For this reason I offer no apology for having directed your attention for a few minutes to the very large issues which necessarily arise. My own views may be erroneous, but their expression may be useful in emphasising the urgent need that our leaders in industry and chemical technology should reflect upon the whole subject and formulate sound views as to the development of the organic chemical industries of the British Empire.

Case for Chemical Warfare

ACCORDING to a *Times* correspondent, Sir William Pope, speaking at Montreal, declared that at the time of the armistice a new vapour was discovered against which respirators would be of no avail. It was so strong, he said, that it would stop a man if it were present in the atmosphere in the proportion of one part to five million. At the same time the Allies had sufficient supplies of mustard gas to have enveloped the Germans knee-deep. Sir W. Pope urged that from the humanitarian point of view gas was more merciful than high explosives. Chemical agencies, he added, would be the sole deciding factor in future wars.

From the same source we learn that the McGill University has conferred the honorary degree of LL.D., on Sir William Pope.

Protection against Carbon Monoxide

ALTHOUGH it was stated in the recent report of the Factory Inspector that carbon monoxide gas masks were only of use when oxygen was also present in the "foul" air, there are obviously many instances where such conditions exist, and therefore where such gas masks are of service. The work on the preparation of an efficient catalyst for the conversion of carbon monoxide to the dioxide, which was carried out in great detail in the American Universities, has had little notice in this country. The catalyst "Hopcalite I," with which American anti-carbon monoxide masks were charged, was the product of investigations of many chemists. Its efficiency may be judged from the following figures, relating to the test which was regularly passed; 90 per cent. of the carbon monoxide—0·25 per cent. in air—was oxidised by a 5 cm. layer of the catalyst when the gas mixture was passed at the rate of 500 c.c. per minute per square centimetre of cross section of the layer. The complete gas mask also contained chemicals for drying the entering gas—the catalyst operating better with dry gas—and means for countering the exothermic effect of the oxidation reaction.

The catalyst—Hopcalite I—consisted of a mixture of metallic oxides, suitably prepared in active condition. The exact composition was manganese oxide 50 per cent., copper oxide 30 per cent., cobalt oxide 15 per cent., and silver oxide 5 per cent. The first three oxides were separately prepared by precipitation, dried and pressed into suitable cakes. The silver oxide was then precipitated upon the mass of mixed oxides, and the whole carefully graded. The manganese dioxide was prepared by a special method, which consisted of the action of anhydrous manganese sulphate, and almost anhydrous sulphuric acid upon potassium permanganate. The oxide of cobalt was precipitated from cobaltous sulphate by a mixture of sodium hydroxide and hypochlorite, whilst copper oxide was made by careful precipitation of the sulphate with caustic soda at about 70°C.

Manufacture of Soap in Canada

CANADA spends nearly fourteen million dollars a year on soap, according to a report relating to the manufacture of soap in Canada during 1918, issued by the Dominion Bureau of Statistics. Thirteen of the twenty-eight plants engaged in this industry are located in Ontario. During the year under review over one hundred million pounds of soap was manufactured in Canada, and the quantity sold by the producers was worth over thirteen million dollars. In addition to this there was imported into Canada something over a million dollars' worth of soap produced in other countries. The report states that exports of soaps amounted to only slightly over one hundred thousand dollars. There is thus an apparent opportunity for the expansion of the soap industry in the country. It is stated that the bulk of the imported soap is of the common or laundry variety, there being some five million pounds of this soap imported during the year under review. Over eight hundred thousand pounds of soap powders was also brought in. The quantity of toilet soap imported is not stated, but the value is given at $592,000. The report is one of a series being issued on the general subject of chemicals and allied products in Canada.

The Hydrogenation of Naphthalene—(I.)

The Manufacture of "Tetralin": A New Solvent

The liquid hydrogenation products of naphthalene—the tetra- and deca-hydro derivatives—are being manufactured in Germany on a large scale. "Tetralin" not only served as a valuable substitute for turpentine during the war, but is one of the few "ersatz" products which is being retained. In the following article, the uses of the tetra- and deca-hydro naphthalenes are considered, and a description of the method of manufacture is given. The conflict of opinion expressed in the German trade papers with regard to the value of "Tetralin" as a turpentine substitute is noted, but, assuming that a satisfactory product is being produced, the relative cheapness with which "Tetralin" can be manufactured should ensure a place for this compound in industry.

THE liquid tetra-hydro and deca-hydro naphthalenes have been known for some time, and their catalytic preparation has been described by Sabatier, Ipatiew and others, but until the successful blockading of Germany during the war forced that country to search every avenue of escape from chemical starvation, the hydro naphthalenes had not been made except in the laboratory, and then by methods inapplicable in technology by reason of cost. Methods were evolved, founded upon the basis of the classical experiments of Sabatier, for converting the solid waste product naphthalene into a liquid derivative, which found successful application in the paint and varnish industry, and which was used to some extent as a burning oil and as a fuel for internal combustion engines. The manufacturing plant of the Tetralin G.m.b.H., at Rodleben, near Rosslau, has a capacity of 120 tons per day, and a large output is still being produced, even if the full operation of the plant is not effected. Extensive research is being conducted, and new applications of the hydro naphthalenes are being found, and tetra-hydro naphthalene may yet find as important a place in the production of dyes, fine chemicals, and synthetic drugs, as benzol itself has done.

Catalytic Hydrogenation of Naphthalene

Highly purified naphthalene was first catalytically hydrogenated by Sabatier and Sendrens in 1901. An excess of hydrogen was passed into heated naphthalene, and the resulting mixture of the two was conveyed to a tube containing carefully reduced nickel. The temperature at which the operation was conducted was 200°C., and the usual precautions were taken to prevent deposition of liquid or solid substances upon the catalyst. From the product condensed from the hydrogen stream, tetra-hydro naphthalene boiling at 205°C. was obtained ("Compt. Rend.," 1901, 132, 1257). Later, in 1904, Leroux obtained the deca-hydro derivative by a similar method, but extended hydrogenation at 175°C. was resorted to ("Compt. Rend.," 1904, 139, 672). By two successive hydrogenations in the presence of catalytic nickel, the same investigator, a year later, obtained the deca-hydro derivatives of the two naphthols ("Compt. Rend.," 1905, 141, 953).

Ipatiew found that naphthalene could be hydrogenated in the presence of nickel oxide as catalyst. By the application of his classic methods, deca-hydro naphthalene was obtained in almost quantitative yield from naphthalene. The latter contained in a pressure bomb, was mixed with Ni_2O_3, and heated to 250°C., under a hydrogen pressure of 120 atmospheres. In conformity with his general observations, Ipatiew found that the oxide of nickel acted more efficiently as catalyst than metallic nickel, and that although the mechanism of the reaction could not be explained, the catalysis was not due to the reduction of the metallic oxide to the metal, which could then act somewhat in the manner obtaining in the Sabatier experiments.

In common with the experience with many organic compounds, it was observed that temperature played an important part in the rate of hydrogenation of naphthalene, a rise in temperature from 200°C. to 250°C. increasing the speed of hydrogenation threefold. Similarly, an increase in the amount of catalyst employed increased the rate of absorption of hydrogen, but not proportionately.

Naphthalene derivatives were also hydrogenated by the Ipatiew method, and α and β naphthols furnished the deca-hydro derivatives (Ber., 1907, 40, 1281).

Tetra-hydro naphthalene was also produced by the hydrogenation of α naphthoic acid, whilst on the other hand, the β naphthoic acid hydrogenated normally, the tetra-hydro and then the deca-hydro naphthoic acid (β) being formed (Ber., 1909, 42, 2049).

The Sabatier and the Ipatiew methods are reasonably general in their application to the hydrogenation of organic compounds, but the method due to Willstatter is still more useful in the laboratory. Many substances which cannot be volatilised can be treated in solution by this method, which employs colloidal platinum or palladium as catalyst. Thus, the hydrogenation of pure naphthalene presented no difficulties (Willstatter and Hatt, Ber., 1912, 45, 1471). Pure naphthalene was dissolved in glacial acetic acid—the commercial naphthalene cannot be hydrogenated—and shaken in the cold with hydrogen, in the presence of platinum black as catalyst. Quantitative yields of the deca-hydro derivative were produced. The catalyst was precipitated by the standard Loew method, but after washing it was not exposed to air, but transferred to a vacuum desiccator.

Finally, Skita and Meyer successfully hydrogenated pure naphthalene dissolved in acetic acid by means of a platinum catalyst, gum arabic being used as a stabilising colloid (Ber., 1912, 45, 3592).

The Manufacture of the Hydro Naphthalenes

The hydrogenation of naphthalene in large quantities is essentially a different proposition from the carrying through of similar operations in the laboratory in many respects, but chiefly in the matter of the purity of the naphthalene. The technical hydrogenation of naphthalene would have been economically impossible had not cheap and efficient purification methods been evolved.

The chief impurity is thio naphthene, the sulphur compound analogous to thiophene occurring in commercial benzene. Impure naphthalene can be detected by means of the red or pink colour which is developed when rubbed with strong sulphuric acid, and this test is employed to ensure the purity of naphthalene prior to hydrogenation on the large scale. The Tetralin G.m.b.H. have concentrated upon the problem of the purification of the hydrocarbon, realising that the ordinary laboratory methods of repeated crystallisation from expensive solvents was not a technically applicable method. Their methods are described in the German Patents Nos. 324,861, 324,862, and 324,863. Molten naphthalene is treated with Fuller's earth, decolourising charcoal, kieselguhr, or other porous substances at a temperature of about 150°C. A suitable quantity of the porous substance, say, 5 to 10 per cent., is kept in intimate contact with the impure naphthalene until a sample shows no red colour when rubbed with strong sulphuric acid. The purified naphthalene is then filtered, or preferably distilled, into the hydrogenation vessel.

In place of, or in addition to, the porous substance, finely divided metals (iron or nickel) and low melting metals (sodium or potassium) may be employed. An efficient purification of ordinary crude commercial naphthalene can be effected in one hour by means of 1 per cent. of finely divided nickel, and 0·75 per cent. of sodium, the treatment being carried out under pressure of hydrogen, and at a temperature of 180°C. The purified naphthalene, distilled off into the hydrogenation vessel under reduced pressure, can be transformed into tetra-hydro naphthalene in the presence of nickel as catalyst, and the latter is not poisoned, being capable of acting for a very considerable time.

As alternative purifying agents may be used such non-acidic compounds of metals as sodium or potassium amide, or aluminium or calcium carbide, 1 per cent. of the compound being effective in three hours at temperatures in the region of 150°C.

Earlier methods which do not possess the same technical advantages in respect of ease and economy of operation as the above described methods and which are therefore not in use at Rodleben, have been patented by the Tetralin

G.m.b.H. (German Patents, Nos. 299,012 and 299,013). Essentially the same purifying agents were to be used, but the operations were to be conducted in the vapour phase, the naphthalene contacting with finely divided metals, fused sodium or potassium, Fuller's earth, &c. Alternatively, crude naphthalene was to be dissolved in benzene, petroleum spirit, tetra-hydro naphthalene, &c., and the purification effected with the above re-agents, under pressure and at temperatures above 100°C.

Hydrogenation of the Purified Naphthalene

The purified naphthalene is usually distilled from the purifying vessels to the hydrogenation autoclave, which is provided with means for effecting intimate contact between the catalyst and the naphthalene, by vigorous agitation. From 5 to 10 per cent. of catalytic nickel supported upon Fuller's earth, or other porous, finely divided inert carrier, is used, and hydrogen absorption is rapid. The reaction is exothermic, and no additional heat is required if the reaction is stopped when the tetra-hydro derivative has been produced. The rate of reaction becomes distinctly more sluggish as the formation of the deca derivative advances, and if this latter product is required, the contents of the autoclave are transferred to a second, containing new catalyst. The catalyst can, however, be employed several times, provided that effective purification has been made, in the manner described above. The hydrogenation is carried out at a temperature of 180°-200°C., and under a hydrogen pressure of 10 to 15 atmospheres. The pressure may be raised to 30 atmospheres when the deca derivative is to be produced.

At the desired point, however, the hydrogen current is cut off, and the pressure reduced to atmospheric. The hydro naphthalene is distilled off, preferably under still further reduced pressure, and the autoclave is charged with new purified naphthalene upon the old catalyst remaining.

Three products are therefore possible—namely, pure tetra-hydro naphthalene, a mixture of this with deca-hydro naphthalene, and the latter itself in the pure condition. These are known upon the market as "Tetralin," "Tetralin Essenz," and "Decalin" respectively. The last named can be obtained in the pure condition by treating a mixture with liquid sulphur dioxide, in which solvent tetra-hydro naphthalene alone is soluble.

Operating Efficiency

The "over-all" efficiency of the process is high, and losses are small. In well-designed apparatus the loss of hydrogen is relatively small, and especially in the production of the tetra-hydro derivative, the reaction is rapid in the presence of active catalyst, and with the use of pure naphthalene. Continuous re-circulation of hydrogen, with consequent tendency to loss, is therefore reduced to a minimum.

The recovery of de-activated catalyst is not difficult. (The original catalyst—made, for example, according to the German patent No. 302,488 (Wimmer), by the reduction of nickel formate made to a paste with oil, or by any of the standard methods as used in the oil hydrogenation process—may be used a number of times before re-activation or regeneration becomes necessary.) Several methods are available, and in default of a satisfactory re-activation process being applicable, solution of the nickel in acid and re-precipitation may be resorted to. In the case of the Fuller's earth supported catalyst, suggested by the Tetralin G.m.b.H., complications may arise due to the support, but the recovery of the nickel presents no more difficult a problem than in the case of the corresponding hydrogenation of liquid glycerides.

Losses of naphthalene in the purification stage by absorption in the purifying porous substance need be very small, so that, all things considered, the technical hydrogenation of naphthalene can be made an economic process.

Hydrogenation in the Vapour Phase

Although there are many obvious advantages in the method of hydrogenating naphthalene in the liquid condition, a process somewhat akin to the original Sabatier method has been patented. Up to the present time, however, there has been no technical application, but the process may be briefly indicated. According to the German patents Nos. 298,541, 298,553 and 301,275 of the Actien Gesellschaft für Anilin Fabrikation, naphthalene vapour mixed with hydrogen is passed over a suitable catalyst at temperatures varying between 150°C. and 200°C., atmospheric pressure being maintained. The reduced nickel catalyst of Sabatier is not, however, employed, but, in its place a mixture of equal parts of the oxides of nickel and copper. It may be that reduction to a metallic catalyst takes place, for it is well known that the presence of copper oxide will materially reduce the temperature at which nickel oxide can be reduced. The mixed copper-nickel catalyst of Dewar and Liebmann is well known as a fat hydrogenation catalyst. The proportions of nickel and copper in the mixture may be varied, and in addition oxide of manganese may be present. For instance, a catalyst composed of the oxides of manganese, copper and nickel in the proportions of 50, 25 and 25 respectively will allow of the hydrogenation of naphthalene at a temperature of 160°C.-180°C. and at atmospheric pressure. Similarly, the oxides of the rare earths may be added, and a mixture of thoria and copper oxide is effective at 160°C.-200°C.

The product in every case is tetra-hydro naphthalene, but it is certain that the process, despite its claimed advantages, cannot compete economically with that of the liquid hydrogenation process of the Tetralin Co.

The Properties of the Hydro Naphthalenes

Both the tetra- and the deca-hydro derivatives of naphthalene are colourless, limpid liquids, in no way resembling the thick, fluorescent oils which have been produced by the hydrogenation and polymerisation of naphthalene in the presence of iodine and hydrogen at 550°C., and 170 atmospheres.

The hydro naphthalenes have an odour of turpentine, and somewhat reminiscent of camphor. Their specific gravities, boiling points and flash points are respectively :—

Tetra-hydro naphthalene, 0·97-0·98, 205°C.-207°C., 78°C.

Deca-hydro naphthalene, 0·89-0·90, 185°C., and 60°C.

"Tetralin Essenz," being a mixture of the two hydro naphthalenes, has, of course, intermediate constants, and in the Engler distillation test the following results have been noted :—

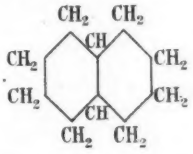
First drop, 125°C.-126°C.

12 per cent. distils below 170°C.

70 per cent. distils below 200°C.

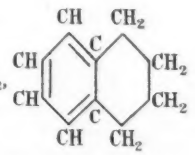
99 per cent. distils below 211°C.

Deca-hydro naphthalene, $C_{10}H_{18}$, is a fully saturated hydrocarbon, which may be represented thus :—



It therefore behaves in many respects like an aliphatic hydrocarbon, and is unattacked by cold strong sulphuric acid, and is insoluble in liquid sulphur dioxide—a property which has been made use of in the technical separation of the hydro naphthalenes.

Tetra-hydro naphthalene, $C_{10}H_{12}$,



on the other hand, may be regarded as a mixed aliphatic-aromatic hydrocarbon. It is soluble in liquid sulphur dioxide, and can be sulphonated by means of strong sulphuric acid. Many substitution products, possessing the substituent in the aromatic, non-hydrogenated ring, can be produced—halogen, nitro, alkyl and aryl derivatives—which are discussed more fully later.

Electro-Automate Lamps

A CONSIDERABLE reduction, taking effect from September 1, is announced in the price of the electro-automate lamps marketed by Messrs. Theo & Co., 6, Hatton Garden, Liverpool, and these prices are stated to be subject to a discount of 25 per cent. It is explained that these reductions are made possible by reduced wages, reduced cost of raw materials, and increased output.

Society of Chemical Industry

Annual Meeting in Montreal

HAVING arrived at Montreal on August 19, the British and other European members of the Society of Chemical Industry attending the Annual Meeting of the Society were met by the Reception Committee in Montreal on August 26, and, on August 28, facilities were provided for a motor trip through the city and around the island. On Monday the business of the meeting commenced at 10 a.m. in the McGill University when a Council Meeting was held. This was followed at 11 a.m. by the Annual Meeting, which consisted of an address of welcome from the Canadian Sections, a reply by Sir William J. Pope, on behalf of the European visitors and the general business of the Society.

The McGill University, a portion of which we illustrate on page 274, was founded in October, 1821. It is stated that James McGill, the founder, was born in Glasgow in 1744. After matriculating into Glasgow University in 1756 he arrived in Canada when the American Revolution broke out. He became a fur trader and amassed a considerable fortune. He was elected to represent one of the electoral divisions of Montreal in the Legislative Assembly, and subsequently he was made a member of the Provincial Cabinet in Lower Canada. In 1811 he made his will, in which he left his real estate and £10,000 to found a College to be known as the McGill University, "in which the youth of Canada might be instructed in religious and moral truths and in the arts and sciences." The College was to be established within ten years of the making of the will. He died on December 19, 1813, in Montreal, and the University was founded nearly eight years later. In this connexion it is interesting to note that Professor Cyrus Macmillan, of the McGill University, is at present engaged in preparing a "Life of James McGill," to be published by Mr. John Lane, of the Bodley Head, Vigo Street, London, and is anxious to receive further information as to McGill's early life in Canada.

McDonald Agricultural College

After the conclusion of the Annual Meeting on Monday, a civic reception and lunch was held, after which the delegates paid a special visit to the McDonald Agricultural College, where the chemical side of agriculture is specially provided for. The day's proceedings terminated with a garden party and supper.

On Tuesday morning a pulp and paper symposium was held at which three papers were read and the Montreal Section of the Society then entertained the visitors to a luncheon at the Windsor Hotel. The afternoon was spent in visits to the various industrial plants and in the evening a banquet was held in the Windsor Hotel.

Special addresses and a number of technical papers were given at the meeting on Wednesday morning, and a luncheon was again provided by the Montreal Section at the Windsor Hotel. After a special convocation at the McGill University members left for a steamer trip down the Lachine Rapids, leaving Montreal by the midnight train for Shawinigan.

Shawinigan Falls Industries

On Thursday, under the auspices of the Shawinigan Falls Section of the Society, a visit was made to the interesting town of Grand Mere, which has grown up around the power plants and the pulp mill of the Laurentide Co., which has an output of 200 tons of newsprint per day. From this point it is easy to appreciate the immensity of the organisation of the scheme for the development of power from the St. Maurice River. The flow of the river is controlled by two dams, one of which forms a lake ninety miles square. Leaving Grand Mere, the party proceeded to the City of Shawinigan Falls, some five miles distant and visited some of the industrial plants there. Among these were the works of the Canada Carbide Co., Ltd., the Canadian Electro Products Co., Ltd., and the Belgo Canadian Pulp & Paper Co., Ltd.

Friday was spent in visits and entertainments in Ottawa under the auspices of the Ottawa Section and to-day (Saturday) has been spent in visits to works and entertainments in Toronto under the auspices of the Toronto Section.

To-morrow (Sunday) the delegates will proceed by boat to the Niagara Falls and on Monday will visit works on the Canadian and American sides. The city of Niagara Falls, which is 83 miles from Toronto by rail, is the seat of great power development and the starting point for transmission lines. Three electric plants generate 410,000 horse-power, and the Hydro-Electric Power Commission are constructing a power canal which will supply 500,000 additional horse-power. Among the chief industries of the city are the electro-chemical, cyanamid, carborundum, graphite and aluminium plants.

After visiting works on the Canadian side the guests will be met by a Committee from the American Section and will receive an official welcome from Governor Miller of New York. They will then be conducted through some of the principal works on the American side of the Falls. A dinner will be provided at Buffalo, where the party will entrain for Syracuse, N.Y. On arrival at Syracuse on Tuesday next a visit will be made to the great factory of the Solvay Process Co. and after a luncheon at these works the delegates will proceed by train to Albany, where they will take the night boat "Berkshire" down the Hudson River to New York.

The programme for Wednesday includes a luncheon to foreign guests by the American Section, a reception and tea at Columbia University and a smoking concert in the evening.

Thursday will be devoted to the usual general, divisional and sectional meetings of the American Chemical Society, at which all visitors will be welcomed. These meetings will be continued on Friday and will terminate in a banquet at which a number of the European members are expected to be present. Saturday and Sunday will be occupied in golf, boat trips and other recreative pursuits.

The Chemical Exposition

The National Exposition of Chemical Industries will be held in New York in the Eighth Coast Artillery Armoury during the week of September 12 to 17. The building selected is a lofty one and has a spacious balcony from which a general view of the exhibits may be obtained. There is a dining-hall with accommodation for 1,400 diners and there is also a good service of subway and elevated trains to the door.

Among the exhibits in the Chemical Engineering Section will be an evaporator, the heating tubes of which are fitted slant-wise and are staggered. From a description of this evaporator it appears that steam enters a top chamber on the left and descends through the tube towards the right; any condensation falls to the bottom and goes out through the pipe provided for that purpose. The steam which is not condensed rises and again descends through the tubes towards the left. The inclination of the tubes, it is claimed, materially increases the flow of the steam giving a large capacity per sq. ft. of heating surface. Well directed and very violent circulation of the liquid undergoing evaporation is said to be one of the outstanding features of this machine.

Oil from Rubber Seeds

ACCORDING to a United States Consular report, there is thought to be every possibility of utilising the large quantity of seed produced on rubber plantations in the Dutch East Indies. In the early stages of the rubber industry in these islands the seeds were used mostly for raising plants in making new plantations, but as there are now more than 1,000,000 acres under rubber trees the quantity of seeds available is much in excess of the planting requirements. Investigations made many years ago by the Imperial Institute showed that the kernels of para rubber seeds yield a large amount of oil similar in properties to linseed oil, and that this oil can be used for paint making and other purposes for which linseed oil is employed, while the cake which is left after the oil has been removed from the kernels is an excellent fodder for live stock. Until quite recently the oil was only used on an experimental scale, but at least one oil mill is now established in Malaya for crushing rubber seeds and small commercial consignments of the oil have been sold in Europe at good prices. Whether it will pay the planter to supply the seeds to an oil mill depends very largely upon the cost of collection, a point upon which experts differ. In view of the present necessity for the exercise of rigid economy on rubber estates and of the enormous demand for oils and feedstuffs, it is highly desirable that serious efforts be made to organise the collection of para rubber seeds wherever it may prove profitable, and so prevent waste of material which is undoubtedly of considerable value.

Impressions of Germany

German Chemists Working for the Future

ON Wednesday last Mr. F. T. T. Reynolds, governing director of Millwards Merchandise, Ltd., Manchester, returned to London from an extensive business tour of the industrial districts of Germany, during which he visited some of the more important chemical and dyestuff works. Discussing his experiences with a representative of THE CHEMICAL AGE, Mr. Reynolds said, first of all, that in travelling from Ostend to the frontier he was most impressed with the rapid progress of reconstruction work in Belgium. Many of the districts devastated by the war seemed already to have recovered to such an extent that they were probably better than ever before.

"At Cologne," he said, "I was immediately impressed by the fact that the place seemed almost more British than German. One sees British soldiers everywhere, and I made particular inquiries as to what the Germans think of them. Everywhere the impression produced is most favourable. I spoke to many people connected with very large German interests, and our men's behaviour was regarded as beyond praise, and in striking contrast to that of some of the other occupying troops. Our men by their exemplary behaviour

MR. F. T. T. REYNOLDS.

seem to me to be doing really valuable work in making the German people familiar with the best sides of English mind and character.

"In visiting one of the largest dye making centres I could not help being struck," Mr. Reynolds observed, "with the way in which the men are settling down to work. I watched them at their duties, and they were certainly tackling their difficulties in a way that might be held up as an example to British chemical and dye works. The works in some instances are the most striking monument to be found anywhere of thorough organisation and experienced efficiency. There is a kind of massive solidity combined with artistic effect. Under present conditions, instead of closing down or running short time, the men continue to work five or six days a week, beginning at 9 and finishing at 4. The workpeople have thus more leisure and they seem to be remarkably well cared for.

"In one very big dye works I noticed that they had recently set up in the hall a fine statue representing peace. I was very much impressed with the firm's exhibition house, illustrating all kinds of natural colourings. You find one section made up of butterflies, with their endless varieties of brilliant and delicate colourings, and alongside them you see silks and satins and other fabrics representing all the corresponding shades and colours produced from coal tar. Other sections include birds, beetles, fishes, leaves, and even stone and marble, with the natural colours and the synthetic colours side by side. It was a wonderful piece of organisation. The pharmaceutical department is not less perfect, and I understand that as the result of recent researches there may be important developments in the direction of agriculture. German chemists have clearly no intention to rely merely on their past; they are working hard for the future."

Asked as to the German attitude towards the Reparations Act, Mr. Reynolds replied that the whole thing was regarded as extremely inimical to British interests, and the conviction was general that we were bound to realise this in the long run. They said very little about the effect on Germany; that aspect did not seem to trouble them.

"In going about," Mr. Reynolds concluded, "I found no evidence of the depression we hear so much about. As I said before, the people seem to be settling down to steady work. The home demand for dyestuffs seems to be good, and the works are kept going. I did not notice any particular shortage of anything. I looked carefully into prices, and came to the conclusion that the internal value of the mark has not depreciated to anything like the same extent as the external value. At the same time the condition is far different from what it was before the war. This 100 mark note, for example, the equal in normal times of our £5 note, cost me 7s. 9d.

"I was agreeably struck, especially in Berlin, with the popular sense of relief at the disappearance of the military *regime*. Formerly one met soldiers everywhere, and very arrogant they were as a rule; now they are conspicuous by their absence. The people make no concealment of their relief at the overthrow of the military element, and everywhere I found a general desire for a better understanding for the future between the British and the German peoples."

Canadian Research Council

Investigations Unavoidably Delayed

WITH reference to the good work which has already been accomplished by the Canadian Research Council, a correspondent of the *Financial News*, in an interview with Dr. R. F. Ruttan, honorary chairman of the Council and the new President of the Society of Chemical Industry, elicited the information that the Council was receiving hundreds of letters from manufacturers and others, asking for advice and investigation. At present, however, the hands of the Council were tied. They could direct the inquirer to the literature on the subject, and could give him advice; and that they were doing to the fullness of their power. But owing to the rejection of the Research Council Bill by the Senate, last session, they were unable to undertake investigation for him.

The result has been that the setting up of this powerful aid to the industrial development of the Dominion has been delayed for another year. It is possible, however, that the entire year will not be lost. On the last day of the session the Premier expressed strong disapproval of the action of the Senate, and stated that it was proposed to go ahead with some of the work. The estimates, as passed, in fact, contain $100,000 for the purposes of the Research Institute, and in the meantime the Research Council can proceed under the powers given to it at its inception. In the past the Council has devoted much of its time to the discovery of new sources of fuel and of new methods of handling low-grade ores.

It has played a large part in finding a successful process for briquetting the lignites of Saskatchewan, the funds for the investigation being supplied by the Dominion, Saskatchewan, and Manitoba. These briquettes are now about to be placed on the market in commercial quantities, the plant having a capacity of 30,000 tons yearly. The product is stated to have almost as many British thermal units per ton as anthracite, and it is said to be a more convenient fuel to handle. The development of peat fuel had been carried on for years by the Mines Department; but during the last two years improvements have been made in the process under the auspices of the Research Council, which in this case was financed by the Governments of Ontario and of the Dominion.

Calvert Dyes, Ltd.

Court's Appointment of Liquidator

A COMPULSORY winding-up order was made against Calvert Dyes, Ltd., of Mirfield, Yorks, in May last, upon the petition of a creditor, and accounts have been lodged showing total liabilities £17,337 (unsecured £4,440); assets valued at £15,234, an estimated surplus of £311 in assets after payment of the debts, but a deficiency of £19,688 as regards contributories.

Mr. H. E. Burgess, Senior Official Receiver, reports that the company was formed in October, 1919, as a private company, to acquire from Mr. Jackson Calvert certain secret processes for the manufacture of aniline dyes and other dyewares, and generally to carry on business as manufacturers of dyewares, chemicals, &c. The nominal capital of the company was £25,000, of which £19,998 was issued in shares to the vendor or his nominees in payment for the beforementioned new and secret processes.

In January, 1920, debentures for £5,000 were created to secure advances made for working capital, and to acquire a tenancy of land at Mirfield from the West Riding Chemical Company, Ltd. The bondholders in March last obtained the appointment of a receiver, but the question of the validity of the bonds was a matter for the consideration of the liquidator. The failure of the company was attributed to insufficiency of capital and to inability to sell goods owing to importation of dyes from Germany and the general slump in trade. In the opinion of the Official Receiver, friction between the directors contributed to the failure.

Mr. H. F. Hartman, City Chambers, Bradford, has been appointed by the Court as liquidator.

Affairs of Nagels and Company

THE first meeting of creditors of Nagels & Co., chemical merchants, 51, Fenchurch Street, E.C., was held at the London Bankruptcy Court on August 25 before Mr. F. T. Garton, Official Receiver. The receiving order was made on August 10, upon the petition of John Elton & Co., Ltd., creditors for £72. The only other proof tendered was by Williams, Gibson & Co. for £37, but it was stated that there were several other creditors who desired to lodge claims, and the meeting was adjourned for a fortnight.

The chairman reported that an inspector had attended at 51, Fenchurch Street, and was informed that the debtor left there in May last, and was believed to be in Hamburg. A creditor stated that the debtor was a Dutchman named Nardick. The chairman added that the inspector had also visited premises in Chancery Lane, in the possession of "London, Limited, Nagels & Co., Allied Merchandise," and had been informed that the debtor was nominally the managing director of that concern, but there was no property there belonging to him except some books and papers, and he had never carried on business in Chancery Lane. The chairman promised to make further inquiries before the date of the adjourned meeting, and invited the co-operation of the creditors in the matter.

Ferrate Manufacturing Company's Affairs

A MEETING of the creditors of the Ferrate Manufacturing Co., Ltd., was held at 27, Regent Street, W., on August 25, Mr. Beamish, the liquidator appointed by the shareholders, presiding. He reported that the company was incorporated on March 1, 1921, with a capital of £10,000. On March 19 a debenture for £5,000 was issued to the British Legion Unity Relief Fund Board, in consideration of a sum of £5,000 then paid, charging the company's undertaking, property, present and future, including the capital for the time being. After taking the debenture the British Legion Unity Relief Fund Board found a further sum of £3,000 for which they were unsecured creditors. On July 27 he was appointed Receiver for the debenture holders, and at an extraordinary meeting of the shareholders held on August 9 he was appointed liquidator.

Mr. Westacott, who said he represented creditors for a large amount, moved that the company should be wound up compulsorily, and the motion was put and agreed to without dissent.

Chemical Exporters' Liabilities

IN the compulsory winding-up of Hill Brothers (London), Ltd., chemical merchants and importers, 5, Fenchurch Street, E.C. (*see* THE CHEMICAL AGE, Vol. IV., pp. 201, 336 and 650), the following are among the creditors. Amounts are given in parenthesis:—May & Baker, Ltd., London (£1,250); Lloyd (Howard) & Co., Ltd., Leicester (£51); Wilkins, Campbell & Co., London (£25); and Chas. Page & Co., Ltd., London (£37).

Chemistry Students

To the Editor of THE CHEMICAL AGE

SIR,—I am sorry that your correspondent, Henry Hilditch, has missed the whole point of my article re "Chemistry Students," &c. Nothing was further from my mind than to indulge in a cheap sneer at academic men, as I number amongst my esteemed friends men holding degrees who are the first to admit on coming into a works laboratory how unprovided they are for the work, and have learned more useful and practical work in three months than three years' preparation for examination had taught them.

It is the perusal of advertisements of posts, such as "University men only need apply," &c., that gives rise to the impression that employers think they are getting someone with the "hall-mark" for their needs, when there are hundreds who would be of more practical use to them who do not possess those qualifications, but are debarred from making application. Thus employers are unwittingly doing the worst for themselves. Mr. Hilditch says he is not a member of the N.A.I.C., and, judging from his letter, he is unacquainted with the rules and objects of the Association. The sooner he communicates with the Secretary the better. Mr. Hilditch is anxious to be a member of an organisation to help to raise the status of chemists. Then, provided he comes up to the standard required for membership of the N.A.I.C., he is the sort of man the Association would welcome.

He will see that the "tester" question, as he terms it, is fully dealt with. How he expects the "tester" to be dealt with outside any organisation I do not know.—Yours, etc.,

"WORKS CHEMIST."

Broken Hill Proprietary Co., Ltd

The Burden of Taxation

THE Broken Hill Proprietary Co., Ltd., has received the following cable from the head office in Melbourne: "General meeting passed off satisfactorily. Chairman stated he regretted report not more encouraging in respect of the mine at Broken Hill. Upon termination of strike, November 10, operations resumed as speedily as possible, with hope of continuous working, in spite of grave misapprehension to the contrary; unfortunately, fears too well founded, as after two months' reluctantly compelled to cease work, as found it impossible to continue except at material loss, due to increased wages and reduced hours. Impossible forecast future, but directors hope readjustment of conditions possible; in fact, before operations resumed such must take place, as little hope for improvement in metal market. Arrangements made for gradual resumption of operations at Port Pirie, but success depends upon readjustment at the Barrier.

"The hope of continued harmonious relations with Newcastle (N.S.W.) employés, as expressed at the last meeting, has materialised, stoppages which occurred being due to other causes. As steel industry is a continuous process, success is only possible by continuity of operations. Our efforts have been seriously handicapped by intermittent operations, and if we are to be in position of holding our own against world competition—and here I would remark such is being experienced—then these recurring interruptions must cease. If Australia is to progress, given immunity from such dislocations, steel industry will become unqualified success. No. 3 blast-furnace blown in August 15 will assist materially to meet demands for pig-iron and result in increased steel production.

"Considering mine closed practically whole period, financial position can be taken as satisfactory. The whole of the discount underwriting and new issue expenses totalling £78,512 9s. 3d. debited in this year's accounts. Taxation proving burdensome, amounting to £242,584."

Swiss Chemical Industry

Manufacture of Dyes and Perfumery

IN the course of an article in the *Swiss Exporter*, Dr. A. Landoll, President of the Swiss Society of Chemical Industry, states that Switzerland is exceedingly poor in raw materials and has to import practically everything from abroad. Switzerland's wealth of water power and the favourable position of the waterfalls made conditions somewhat easier for the chemical industry of the country after the problem of transportation of electric power had been solved and large power stations had been built on the Rhine, the Aar, the Doubs, and the Rhone. In particular, a foundation was laid for electro-chemistry and electro-metallurgy which led to an enormous development, so that the condition of relatively cheap motive power could be fulfilled.

The chemical industry of Switzerland owes the second condition —the existence of trained and skilled chemists—in the first instance to the development of Swiss federal and cantonal educational establishments, particularly the Federal University and Polytechnicum and the chemical institutions which have maintained an intimate connexion between science and industry.

The most important export branches of the Swiss chemical industry, states Dr. Landoll, are the Basle aniline dye factories and the electro-chemical and electro-metallurgical works. These comprise all the Swiss concerns which are occupied with the manufacture of artificial organic dyestuffs and the preparation of dyeing extracts.

Coal Tar Dyes

The production of coal tar dyes, according to Dr. Landoll, increased from year to year and the Basle firms were keen competitors in the international markets. Since 1911 the Society for Chemical Industry, Basle, has taken up the manufacture of artificial indigo and thus become a competitor of Germany. In order to be able to keep their place in the world's markets during the transition period and to compete successfully with Germany in future, the three leading Basle factories, the Society for Chemical Industry, the Chemical Works, formerly Sandoz, and the firm of J. R. Geigy, Ltd., formed an amalgamation in 1918 similar to that of the German factories, which provides for a community of interests for a period of fifty years. About 90 per cent. of the total production of these firms goes abroad.

Founded in 1864 and transformed into a limited liability company in 1885, the Society for Chemical Industry at Basle now has a capital of 20,000,000 fr. and gives employment to more than 2,700 hands and 530 commercial and technical employees. Hence it occupies a not unimportant place in the chemical industry of the country both as regards the manufacture of dyes and the preparation of pharmaceutical and photographic products.

During the last few years (from 1913 to 1919) the exports of aniline dyes increased from 25 to 123·6 million fr. The export value of artificial indigo rose in the same time from 3·9 to 12·2 million fr.

Synthetic Perfumery

The synthetic perfumery industry was introduced into Switzerland in 1895, and at first was only on a small scale. The industry made rapid progress, however, and became successful in a comparatively short time. The six important firms which make these articles turn out natural perfumes by synthetic methods. The main business is done in exportation. The exports of perfumes and soaps totalled 16·1 million fr. in 1919.

The extension of the use of water power in Switzerland during the last two decades has contributed enormously to the development of the electro-chemical and electro-metallurgical industries. The oldest and at present the largest is the Aluminium Industry Co., Ltd., of Neuhausen, with works on the Rhine Waterfall and at Chippis, which is said to have been the first in the world to produce pure electrolytic aluminium according to its own process. Nearly all electro-chemical manufactures produced abroad are also manufactured in Switzerland. The old methods based on chemical processes have been replaced by the electrolytic process, such as the manufacture of metallic sodium, caustic soda and chlorine, chloride of calcium, together with a number of other inorganic and organic derivatives of chlorine. The manufacture of oxygen, hydrogen, nitric acid, hydrocyanic acid, nitrate of urea and their derivatives, then the persulphates, perchlorates, calcium metal, silicon, ferrosilicon and ferrochrome, may also be mentioned.

Sir John Cass Technical Institute

THE new session of the Sir John Cass Technical Institute, Aldgate, E.C.3, will commence on Monday, September 26. Students will be enrolled during the previous week commencing Monday, September 19, between 7 and 9 p.m. The courses of instruction at the Institute are especially directed to the technical training of those engaged in chemical, metallurgical and electrical industries and in trades associated therewith. Full facilities are provided in the well-equipped laboratories of the Institute for special investigations and research. The instruction in experimental science also provides systematic courses for the examination of London University and of the Institutes of Physics and Chemistry. Special courses of higher technological instruction form a distinctive feature of the work of the Institute. For the forthcoming session these include courses on the fermentation industries, glass technology, colloids, metallography and pyrometry, heat treatment and mechanical testing of metals and alloys. An important development for the new session is the establishment of courses of instruction in petroleum technology. These have been arranged in consultation with representatives of the chief oil companies and have been designed to meet the requirements of those engaged in or associated with the practical and scientific control of the petroleum industry. In view of the fact that most of the chief oil companies have their offices and several have their laboratories in the immediate district, the Institute is very favourably situated for this branch of instruction, which it is anticipated will form a most valuable extension of the work of the Institute. The leading oil companies have very generously contributed towards the establishment of this department of petroleum technology.

Alkali Salts in Nigeria

AN article in the *Bulletin* of the Imperial Institute deals with a series of alkali salts of vegetable and mineral origin from Nigeria, which have been examined at the Institute. The salts obtained from vegetable sources were mostly in the form of cones, and were obtained by burning the branches of trees, lixiviating with water, and allowing to crystallise. They consisted essentially of sodium and potassium chlorides in varying proportions from 9·62 to 67·60 of the former and 28·76 to 81·16 per cent. of the latter. The mineral salts were obtained by evaporating the water from pools or by lixiviating the soil in certain districts and evaporating the solutions. Sodium chloride is the chief constituent in several of these salts, but one sample from the Manga district contained 97·70 per cent. of sodium sulphate, while this salt is present in many other samples in varying proportions. Four of the samples, known as "red potash," "white potash," and "Chad Natron," were natural alkalies, containing 31·90 to 58·69 per cent. of sodium carbonate and 12·87 to 34·57 per cent. of sodium bicarbonate.

Moroccan Phosphate Exports

THE *Journée Industrielle* learns that the first shipment of phosphates from Oued-Zem has recently been loaded at Casablanca. The shipment, which is of 300 tons, is intended for the Société de Saint-Gobain. The phosphate beds in the El Borouj and Oued-Zem regions consist of a remarkably extensive formation. The beds are nearly horizontal, and are situated at about 150 kilometres to the south-east of Casablanca. The upper bed has a thickness varying from 1½ to 2 metres, and the tribasic phosphate contents are high, reaching as much as 75 per cent. It is estimated that several hundred million tons of rich phosphate are contained in the bed. It is not anticipated that the exploitation will present technical difficulties as the bed is easily accessible. The work of extraction is being carried out by an Office des Phosphates under the Protectorate.

Midland Mining Engineers

Annual Meeting at Sheffield

THE annual general meeting of the Midland Institute of Mining, Civil and Mechanical Engineers was held at the Mappin Hall, Sheffield University, on August 25, Mr. J. H. W. Laverick presiding. The ballot for the officials resulted as follows: President, Lt.-Col. Harry Rhodes; vice-presidents, Messrs. E. W. Thirkell, R. Clive and J. Gill; Council, Messrs. G. H. Ashwin, J. R. Wilkinson, H. Smithson, G. Poole, C. H. Merrivale, A. C. F. Assinder, and J. Brass.

The annual report showed that the membership was 525, an increase of 27. During the year 66 new members had been elected, 12 had died, and 9 resigned. The balance at the bank at the commencement of the year was £350, and for the year ended £707.

The meeting passed a vote of condolence with the relatives of the late Mr. G. Blake Walker, who was president of the Institute in 1896-1898; and a very hearty vote of thanks was accorded the retiring president.

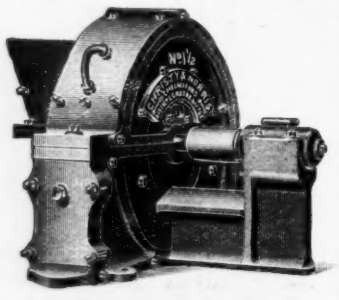
Mr. Stanley Nettleton, of the Royal School of Mines, read a paper on "Friction Co-efficient of Minerals," and afterwards in an informal discussion referred to the separation of coal from shale and other undesirable associates by mechanical means. He also demonstrated a model of a machine for this purpose. Coal and shale were placed on a shute which fed on to a revolving drum, and it was found that the coal was shot off the drum in one direction, and the shale in an entirely different direction, thus mechanically separating the two. The principle of the machine, he explained, depended upon there being a difference in the friction of various minerals when they slide over a smooth surface. A piece of coal would slide over a smooth sheet of steel more rapidly than shale or pyrites of equal size.

Mr. A. Yeadon read a paper on "Low Temperature Carbonisation and Smokeless Fuel," in which he urged that the use of the ovoid briquettes would solve the smoke problem besides conserving the available fuel. He did not suppose he would live to see a smokeless Sheffield, but it could be attained by the use of this fuel. They could be produced from the smallest and cheapest coal, and every ounce of coal raised could be profitably utilised.

Grinding Machinery

The accompanying illustration of the disintegrator which is manufactured by Christy & Norris, Ltd., of Chelmsford, is of interest to those who have to reduce various materials to coarse or fine powder.

The action of the machine is simple, the grinding being done by four arms which are fitted into a cast-iron boss revolving in an enclosed chamber into which the material to be ground is fed. These arms, which revolve at a high rate of speed, beat the material and break it into fine pieces, which escape from the grinding chamber through the screens which are fitted round the bottom half of the machine; the material escapes as soon as it is reduced to the required degree of fineness. The makers state that there is no rubbing action, so that power required would be small for the output obtained; it is further claimed that wear and tear is very slight. The screens are made from one sixty-fourth of an inch up to two-inch mesh, so that practically any grade of finished material can be obtained.



This machine may be employed in the grinding of bones and other materials used for manure, roots; barks and leaves for medicinal purposes; crystals, soft rocks for chemical work; myrabolams and valonia for tanning purposes; sugar, spices, maize and other kinds of corn for feeding purposes; locust beans and even such soft and tough materials as leather, feathers and indiarubber.

The firm intimate that they are willing to give information on grinding propositions of all kinds to firms interested.

Portland Cement in Yorkshire

A New Humberside Industry

WHAT is probably the largest industrial concern that has been established in Yorkshire since the war has commenced operation on the Humber bank, ten miles west of Hull. Describing these works a correspondent of the *Yorkshire Post* states that the works are spread over 600 acres, with rail and river frontages extending over a quarter of a mile. They are served by a special railway station at Melton, on the main line between Leeds and Hull, and permission has already been given by the Humber Conservancy for the erection of a wharf on the river side. The huge buildings forming the factory stand between the Melton quarries (which yield practically unlimited supplies of chalk) on the north, and the flats of alluvial clay deposited by the Humber on the south, so that the raw material is on the spot, and not one penny will have to be paid to carry it to the factory. Moreover, the company have their own water supply, and the South Yorkshire coalfield is only 25 miles away.

An interesting feature of the undertaking is that the works are run entirely by electricity from mains laid by the Hull Corporation; a ten-mile cable conveys from the Hull power station 35,000 units a day.

The firms entrusted with the building and equipment are Messrs. Maxted & Knott, Ltd., consulting engineers, Hull; Mr. D. B. Butler, principal of the firm of Henry Faija & Co., consulting chemists, of Westminster; Messrs. Edgar Allen & Co., Ltd., Sheffield, steel manufacturers and cement machinery specialists; and Messrs. H. Arnold & Sons, Ltd., Doncaster, who constructed the ferro-concrete silos.

At Melton the chalk appears just below a thin covering of turf, and the great "digger," working on a face about 20 ft. deep tears out the stone at the rate of four tons per scoop, and drops it into the wagons, which, on an ordinary gauge railway with a gradient of 1 in 30, conveys it to the revolving crushers in a ferro-concrete building, which alone cost £40,000. From the crushers, the chalk, after being treated to another reducing process, is passed as "slurry" into the great mixing tanks, which have a capacity of 1,500 tons, where it receives its proportion of clay.

A group of six storage tanks, each 80 ft. high, and holding about 700 tons of "slurry," is a dominant feature in the landscape. In these tanks the liquid is kept moving by powerful currents of compressed air, until it is required for the kilns, where it is cooked into clinkers. Machinery driven by 400 H.P. motors crushes these clinkers into a powder, which is conveyed automatically into a ferro-concrete silo, holding fully 6,000 tons. Finally, the finished cement is passed into the store, a building 140 ft. long by 60 ft. wide, where the product is heaped up to a height of 25 ft. Even in packing, manual labour is dispensed with, the sacks being weighed, filled, and delivered automatically at the rate of 300 per hour, ready to be put on rail.

Production of Alcohol from Carbide

WRITING from Berlin a special correspondent of *Drug and Chemical Markets* states that towards the end of 1920, the Badische Anilin und Sodafabriken took up the production of alcohol from carbide with a view to supplying the quantities of dyestuffs as fixed by the terms of the Peace Treaty. Only 1,000 hectolitres were produced during the first quarter of 1921 at Ludwigshafen, but the plant is stated to have a capacity of 15,000 to 30,000 hectolitres per year. Of sulphite spirit works, 10 plants are still in operation, which produced, however, only 30,000 hectolitres during 1920, though the 1921 production shows an improvement, output up to the middle of June being given as 30,000 hectolitres. He adds that for the synthetic production of alcohol, the calcium carbide process ranks foremost in importance. A plant for production by this process is in the course of construction at Burghausen in Bavaria with an estimated annual output of 10,000 hectolitres as compared with a production of 500 to 1,500 hectolitres per year for the average distillery. Production of wood alcohol synthetically has, he says, turned out a hopeless failure, the last plant where operations were continued for experimental purposes having closed down some time ago.

From Week to Week

ROBERT YATES & CO., chemical importers, have commenced business at 205, Buchanan Street, Glasgow.

THE LIBRARY of the Chemical Society will continue to close daily at 5 p.m. until September 10.

PROFESSOR EINSTEIN attended the International Congress of Astronomical Soceities, which opened at Potsdam on August 25.

The annual meeting of the French SOCIÉTÉ DE CHIMIE INDUSTRIELLE will be held between October 9 and 12 at the Conservatoire National des Arts et Métiers.

The 1921 Conference of the SOCIETY OF LEATHER TRADES' CHEMISTS will be held from September 7 to 9 at the Leathersellers' Hall, St. Helens Place, E.C.3.

Statistics issued this week by the Russian Trade Delegation in London show that 5,600 tons of chemicals were IMPORTED INTO RUSSIA during the first half of this year.

Mr. H. T. Watson, chemical engineer, of Fairfield Road, Widnes, is now sole agent in this country for the Monarch Manufacturing Works, Pa., and British representative of the Buckeye Rotary Dryer Co., Columbus.

Mr. WILFRED EVANS, foreman of the electrical department of the Briton Ferry Chemical Works, has been appointed head of the electrical department of the State Railways of the Malay Peninsula, and sails for Malaya on October 1.

A start will shortly be made on the construction of a NEW CHEMICAL LABORATORY at Yale University, New Haven, Conn. The laboratory, it is stated, will be one of the largest and most completely equipped in the world.

Mr. S. HERMANOS, chemical manure merchant, of Vigo, Portugal, is a creditor for £17,000 in the bankruptcy of H. A. Flinn, steel merchant, whose total liabilities are £68,776, against net assets estimated to realise £3,948.

The Board of Trade announces that any inquiries relating to the SAFEGUARDING OF INDUSTRIES ACT should be addressed to the Assistant Secretary, Board of Trade (Industries and Manufactures Department), Great George Street, S.W. 1.

The Amsterdam correspondent of the *Financial News* refers to a cable received from Singapore announcing the invention of a new process for PREPARING RUBBER DIRECT FROM THE LATEX. It is stated that rubber treated by this process is ready for export within two days.

Bristol has been selected for the FOURTH PROVINCIAL CONFERENCE of the National Council of the Commercial Motor Users' Association, to be held on October 5 and 6. Sir Henry Maybury, K.C.M.G., Director-General, Roads Department, Ministry of Transport, has promised to attend.

Mr. S. D. BRATLEY, a labourer in the employ of the British Dyestuffs Corporation, Ltd., who was concerned in an assault case at Bradford last week, was during the war awarded the O.B.E. for putting out a fire in a shed where large quantities of TNT. were stored.

One or two other bids are reported to have been received by the United States Government for the purchase of the nitrate plant at Muscle Shoals, Ala., but they have been rejected as unsatisfactory by the Government. Mr. Henry Ford's offer of about $150,000,000 for a hundred years, is said to be the best received to date.

DR. IRVING LANGMUIR, assistant director of the research laboratories of the General Electric Co. of America, who is opening the discussion on "The Structure of Molecules" at the Edinburgh Meeting of the British Association next week, will be awarded the honorary degree of Doctor of Laws by the University of Edinburgh.

The staff of H.M. EXPLOSIVES FACTORY, GRETNA, are reported to have received notice to terminate their engagement on August 31. Altogether between 500 and 600 people are concerned and it is stated that up to the present only about 50 have received intimation that their services may be required by the Disposals Board.

The Textile & Chemical Products Co., Ltd., announce that they have bought the stock and taken over the premises of the Thompson Chemical Co., at 105, George Street, Manchester. The services of Mr. John Thompson have been retained as secretary and manager, and this will ensure the Company against any break in continuity or personal connexions.

The new trade in phosphate which has sprung up at Swansea gives every indication of rapid increase. During the week-end the s.s. *Saxibly* completed the discharge of a cargo of 5,800 TONS OF PHOSPHATE from Nauru Island. Part of the consignment was railed direct from the ship's side to various parts of the country, and the remainder was stored at the docks.

The West India Committee Circular points out that the value of the carbonic acid generated in fermentation is an important item in the MANUFACTURE OF POWER ALCOHOL. In the production of 100 gallons of 95 per cent. alcohol, 760 lb. of carbonic acid are produced, which can be collected and liquefied by suitable machinery, thus considerably reducing the cost of production.

The Secretary for Mines gives notice that, on August 24, he made an order under Section 61 of the Coal Mines Act, 1911, entitled "The Explosives in Coal Mines, Order of August 24, 1921." The effect of the order is to extend to December 31, 1923, the period during which the NON-DETONATING EXPLOSIVES named and defined in the Second Schedule to the Explosives in Coal Mines Order of September 1, 1913, are included in the term "permitted explosives."

The Belgian Ministry of National Defence have INVITED TENDERS for the supply of drugs, scientific glassware, &c., for the Pharmacie Centrale de l'Armée, 494, Avenue Marie, Antwerp. The contract is divided into three parts for which adjudications will take place on August 30, and September 6 and 13 respectively. Copies of the specification and conditions of tender (in French) may be inspected by United Kingdom manufacturers and exporters on application to the Enquiry Room, Department of Overseas Trade, 35, Old Queen Street, Westminster, S.W.1.

THE ENGINEERS' CLUB opened its club-house, which is situated at the corner of Coventry Street, and Whitcomb Street, W., on Thursday. There are 76 bedrooms with telephone and fireplace in each. The billiard room contains five full-size tables, and in all other respects with regard to reading, smoking, dining, card rooms, &c., it will be a worthy London headquarters of the engineering profession. The hon. secretary of the club, Mr. E. L. Hill, has received a letter in which the Prince of Wales conveys his best wishes for the success of the club.

The 1921-22 programme of LECTURES TO SCHOOL TEACHERS organised by the London County Council provides for six lectures on Crystal Structure, by Sir W. H. Bragg; ten lectures on Science in Elementary Schools, by Dr. C. A. Keane. Other lectures in the syllabus include "The Wonders and Problems of Food," by Professor H. E. Armstrong; "Yeast, what it is and what it does," by Mr. A. Chaston-Chapman; "Aluminium and its Alloys," by Dr. W. Rosenhain; "The Relation between Pure and Applied Chemistry," by Dr. M. O. Forster; and "Vitamines," by Professor A. Harden.

The Secretary of State for the Colonies has appointed Sir C. H. BEDFORD, LL.D., D.Sc., M.D., to be his honorary adviser on questions relating to power and industrial alcohol in the Colonies and Protectorates. Sir Charles Bedford is an acknowledged authority on subjects related to alcohol. Before his retirement from the Indian Medical Service in 1911, he carried out important investigations for the Indian Government on the quality, manufacture and excise-control of alcoholic liquors in that country. He was also scientific and technical adviser to the Indian Government on excise and Customs matters. He was the first general director and secretary of the Association of British Chemical Manufacturers.

It is officially announced that the regulations made by the Home Secretary under the DANGEROUS DRUGS ACT, 1920, came into force on Thursday. After this date no person may have in his possession any morphine, cocaine or heroin, or any preparations containing at least 0.2 per cent. of morphine or 0.1 per cent. of heroin or cocaine, or any medicinal opium, unless he is licensed by the Home Office or is otherwise authorised by the regulations, or by the Home Office, or unless it is supplied on a prescription given in accordance with the conditions specified in the regulations. A few preparations (including Dover's powder and gall and opium ointment) are exempted from the operation of the regulations. The regulations also continue with modifications the existing restrictions in regard to raw opium, which have been in force under the Defence of the Realm Act. Copies of the regulations can be obtained through any bookseller or directly from His Majesty's Stationery Office.

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Abstracts of Complete Specifications

166,929. ZINC LEAD ORES AND THE LIKE, TREATMENT OF. J. J. Collins, 9, Leicester Street, Southport, Lancs. Application dates, February 24 and December 18, 1920.

The process is for obtaining the metals from zinc-lead and like sulphide ores. The ore or concentrate is finely powdered and mixed with a solution of a lower chloride of a metal which forms both higher and lower chlorides, such as iron or tin. The mixture is acidified with hydrochloric acid and chlorine is then passed through it. If stannous chloride is used, the chlorine converts it into stannic chloride which converts the lead sulphide into lead chloride, leaving the zinc sulphide substantially unattacked. The solution is heated during the reaction, so that the lead chloride remains in solution but precipitates on cooling. The liquor is then drawn off and consists of stannous chloride solution with a small quantity of lead chloride. This solution is used again for treating a further quantity of ore, the lead chloride being allowed to remain in it. If copper is present in the ore it will be found in the liquor as copper chloride, and may be precipitated by adding metallic tin. The residue contains zinc sulphide, sulphur, lead chloride, and possibly silver chloride. The residue is washed with cold dilute hydrochloric acid to remove any traces of stannous chloride, and then with hot saturated brine which dissolves the lead chloride. The hot solution is drawn off, and the lead chloride precipitated by cooling. The brine may be used repeatedly for this purpose. Silver may be recovered from the residue by dissolving out the chloride with ammonia or sodium thiosulphate. The residue containing zinc sulphide and sulphur may then be treated by any known method for the recovery of zinc.

166,934. TRINITROTOLUOL, REDUCTION OF. E. Bielouss, 1845 B Street, N.W., Washington, D.C., U.S.A. Application date, March 25, 1920.

Specification No. 137,529 (*see* THE CHEMICAL AGE, Vol. II., page 311) describes a process for reducing trinitrotoluol to triaminotoluene by means of iron and hydrochloric acid, but soluble iron salts are also produced, and are difficult to remove from the solution of triaminotoluene. It is now found that this disadvantage may be removed by effecting the reduction in the presence of iron and water with a small proportion of hydrochloric acid. Ferrous chloride is probably produced, and acts as a catalyst to produce ferrous hydrate by interaction of the water and iron. The mixture finally contains a solution of triaminotoluene, and ferrous hydrate and iron in suspension, so that they may be removed by filtration. The reaction is carried out at 60°C.-80°C., and the iron and trinitrotóluol are added in small portions. A yield of 89 per cent. of triaminotoluene may be obtained by this process; it may be used as a dye or as a starting substance in the production of other dyestuffs.

166,961. SULPHUR BURNING FURNACES AND THE LIKE. T. A. Clayton, 48, Rue de la Victoire, Paris. Application date, April 23, 1920.

The apparatus is for effecting a complete combustion of sulphur so that the risk of choking the conduits with uncombined sulphur is avoided. The furnace chamber, *a*, is provided with a tubular element, *b*, consisting of a straight portion, *d*, which diverges in both directions forming circular branches, *c*, which are closed at their ends, *e*. The part, *c*, is provided with two sets of openings or nozzles, *g*, *h*, which are directed downwards and upwards respectively. Air is thus supplied to the burning sulphur at the bottom of the furnace, and also upwards into the top of the furnace to complete the oxidation of any volatilised sulphur. This arrangement of air jets enables a hopper feed to be arranged in the crown of the furnace, the downward passage of the sulphur being uninterrupted by any baffle plates as in the usual apparatus. The proportions of air supplied to the two series of openings may be varied by providing a horizontal partition in the curved tube, *c*, and by providing a flap valve to control the passage to the upper or lower parts of the tube. In an alternative device, the tube *c* may be straight, and may be provided with an internal or external sleeve having openings, *g'*, to enable the openings, *g*, to be partly closed while the openings, *h*, are uninterrupted.

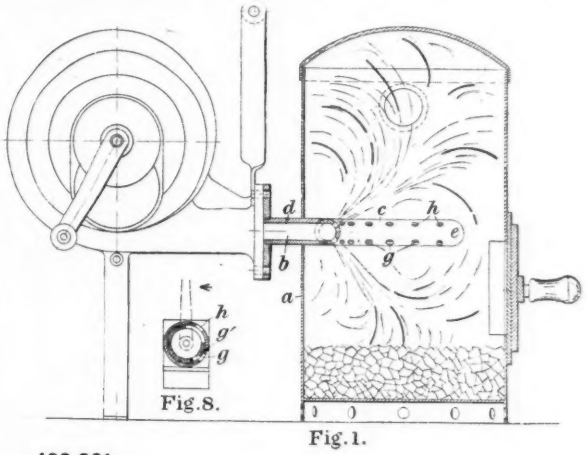


Fig.8.

Fig.1.

166,961

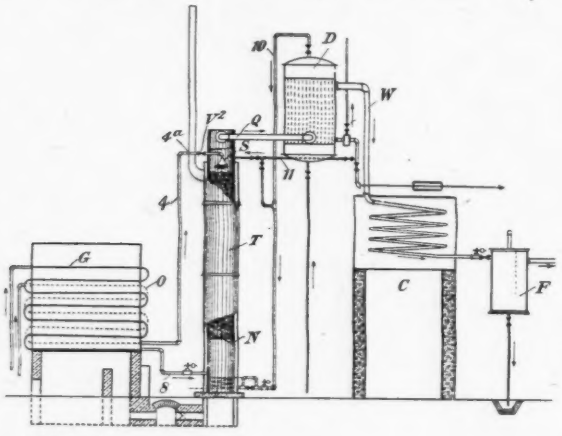
166,971. HYDROLYSIS, PROCESSES OF—PARTICULARLY THE SPLITTING OF OILS AND FATS. P. J. Fryer, Ravenscar, Tonbridge, Kent, and Catalpo, Ltd., 19-20, Holborn Viaduct, London, E.C.1. Application date, April 24, 1920.

The process is more particularly for the hydrolysis of glycerides such as oils and fats. It is found that the process of hydrolysis is expedited by effecting the reaction in the presence of colloidal clay. The hydrolysis is carried out under any suitable conditions of temperature and pressure, and by the use of the usual hydrolysing agents such as bases, alkalies, sulpho-aromatic or sulpho-fatty compounds, lipolytic ferments, &c. To prepare the colloidal clay, a china clay such as Fraddon clay is washed by passing it over mica drags with a solution of sodium carbonate of 0·06 per cent. strength. The clay dispersion is then allowed to settle for further deposition of mica, and is then precipitated in another tank by adding a weak solution of alum. Ammonia may be used in place of sodium carbonate. In one example, a paste of 45 lb. of colloidal clay, 450 lb. of zinc oxide, and 15 cwt. of water, is added to 3 tons of cottonseed oil in an autoclave. Steam at a pressure of 90 lb. per square inch is then pasesd through, and the mixture heated under pressure for about 8 hours. About 95 per cent. of the oil is converted into glycerine and fatty acids. The acids are suitable without further purification for industrial purposes such as soap manufacture.

166,989. HYDROCARBON OILS, MEANS FOR TREATING. E. F. Engelke, Tampico, Tamaulipas, Mexico. Application date, April 27, 1920.

The apparatus is for producing saturated hydrocarbons of low boiling point from higher boiling hydrocarbons without the formation of elementary carbon. The crude oil is drawn from a reservoir and forced by a pump through a preheater, *O*. The hot oil then passes through a pipe, 4, with branches 4^a, and regulating valves, V^a, to the top of a series of towers, *T*. Gas containing free hydrogen is forced by a blower into a receiver having a safety valve and pressure gauge, and thence to a preheater, *G*, where it is heated about 200°-400°C. above the temperature at which the lowest fractions in the crude oil evaporate. The gas then passes through a pipe, 8, to the bottom of the towers, *T*, through which it passes in counter current to the oil. Each tower contains a perforated plate, *N*, carrying a column of charcoal, hollow nickel, copper, or iron cylinders to distribute the liquid which is received from sprayers, S. Vapour from the towers, *T*, passes by a pipe, *Q*, to a dephlegmator, *D*, which may be a straight tube condenser which is fed with hot unconverted oil at about 180°C. to

condense all fractions boiling above that point. The oil passes from the top of the dephlegmator by a pipe, 10, to a receiver where it is mixed with hot oil from the bottom of the tower in a continuous cycle. The condensed fractions pass from the dephlegmator by the pipes, 11, to the top of the



166,989

towers, *T*. The light fractions pass through pipes, *W*, to water-cooled condensers, *C*, where the gasolene is condensed. The uncondensed gas is passed through traps, *F*, and may be returned to the cycle or used for heating the preheaters, *O* and *G*.

167,041. GRAPHITE ELECTRODES FOR USE IN ELECTROLYSIS. MANUFACTURE OF. C. L. Higgins, D. A. Pritchard and The United Alkali Co., Ltd., Cunard Buildings, Liverpool. Application date, June 7, 1920.

The object is to avoid the rapid disintegration of graphite electrodes which are employed in electrolysis due to their highly porous character. The graphite is placed in a vessel in which as high a vacuum as possible is produced. A solution of chloride or sulphate of iron or manganese or a mixture of these is then introduced to impregnate the graphite which is then allowed to dry. To prevent diffusion of these salts into the electrolyte they may be converted into insoluble compounds such as the hydrated oxides of iron or the hydrated dioxide of manganese.

167,066. 2-PHENYL-QUINOLINE-4-CARBOXYLIC ACID, MANUFACTURE OF ARALKYL ESTERS OF. O. Imray. London, (From Society of Chemical Industry in Basle, Switzerland). Application date, July 5, 1920.

The esters are formed by treating the salt of 2-phenyl-quinoline-4-carboxylic acid with a halide of an aralkyl alcohol in a convenient solvent, or by passing dry gaseous hydrochloric acid into a solution of 2-phenyl-quinoline-4-carboxylic acid in an aralkyl alcohol, or by heating this solution with concentrated sulphuric acid, or by treating a halide of 2-phenyl-quinoline-4-carboxylic acid with an aralkyl alcohol. These esters are of greater medicinal value than the corresponding alkyl or aryl esters.

NOTE.—The abstracts of the following specifications which are now accepted appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 139,488 (G. P. Lunt) relating to recovery of solvents, *see* Vol. II., page 511; 140,784 (Soc. Anon de Produits Chemiques (Etablissements Maletra), relating to acetaldehyde produced from acetylene, *see* Vol. II., p. 615; 144,658 (Badische Anilin & Soda Fabrik), relating to yellow dyes, *see* Vol. III., p. 213; 145,523 (Akt.-Ges. fur Anilin Fabrikation) relating to sulphurised dyestuffs, *see* Vol. III., p. 293; 146,133 (Soc. Electro-Metallurgique Francaise), relating to aluminate of lime and pure alumina, *see* Vol. III., p. 320; 153,606 (R. Marchand), relating to terpin hydrate, *see* Vol. IV., p. 133; 157,152 (K. A. F. Hiorth), relating to gas reactions under high pressure, *see* Vol. IV., p. 404

International Specifications not yet Accepted

165,446. SYNTHETIC DRUGS. F. Hoffmann-La Roche & Co., Akt.-Ges., 184, Grenzacher Strasse, Basle, Switzerland. International Convention date, June 22, 1920.

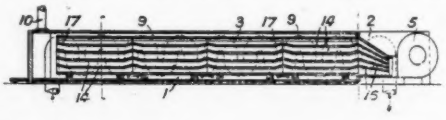
The alkali compound of 3 : 7-dimethylxanthine is treated with allyl bromide at temperatures below 100°C. and at atmospheric pressure in the presence of water or alcohol to produce 1-allyl-3 : 7-dimethylxanthine.

165,721. DYES. Durand & Huguenin Akt.-Ges., Basle, Switzerland. International Convention date, June 30, 1920.

Basic acridine dyes or their leuco-compounds are halogenated in presence of a solvent or diluent to produce halogenated acridine dyes which give red shades, fast to chlorine, on leather, tannin mordanted cotton and natural or artificial silk. In one example, a mixture of acridine orange, sodium bromide, and sulphuric acid is heated, poured on to ice, and the dyestuff salted out. In another example, acridine is treated with bromine with or without sodium chlorate in nitrobenzene solution. In another example, leuco tetramethyldiamino-acridine sulphate is dissolved in dilute sulphuric acid, treated with chlorine, and the dyestuff salted out.

165,722. DISTILLING WASTE LIQUORS. Aktiebolaget Cellulosa, 41, Regeringsgatan, Stockholm. International Convention date, June 29, 1920.

Waste liquor from pulp mills or the like is contained in a number of shallow trays 14 carried by wheeled trucks 9,

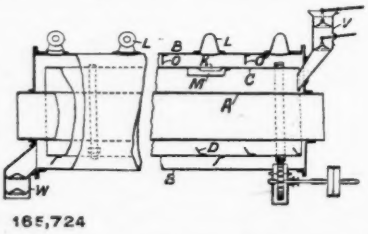


165,722

which are placed end to end so as to form continuous passages through which heating gases are circulated. The gas is circulated by a fan 5 through the chamber 1 to a parallel chamber 2 which contains an electric heater. Distillation gases are removed by a pipe 10.

165,724. RETORTS. Deutsche Petroleum-Akt.-Ges., 37, Mauerstrasse, Charlottenburg, Berlin, and S. Kacser, 16, Hederstrasse, Charlottenburg, Berlin, and E. Bauer, Eislingen a fils, Wurtemburg, Germany. International Convention date, July 3, 1920.

Bituminous material is fed from the hopper *V* to a rotary retort *C* within a stationary casing *B*, and is heated by a central steam heating tube *A*. Blades or buckets *D* are



165,724

arranged in the retort to distribute the material. Gas escapes through openings *K* which are provided with hoods *M* to prevent loss of solid material, and the gas is drawn off through outlets *L*. Each section of the retort is provided with its own gas outlet *L*, and division plates *O* prevent mixing of the gases. Dust passes through the openings *K* and is discharged with the residues to the outlet *W*.

165,728. CROTONIC ACID. Elektrizitätswerk Lonza Akt.-Ges., Gampel, Switzerland. International Convention date, July 2, 1920.

Crotonaldehyde is oxidised at ordinary temperature by the aid of a manganese catalyst into crotonic acid. To produce the catalyst, manganese acetate is dissolved in glacial acetic acid, mixed with permanganate and diluted with glacial acetic acid. Crotonaldehyde is gradually added to this mixture in a water-cooled vessel, and oxygen is passed through. Acetic acid is then distilled off, leaving solid crotonic acid.

165,743. ALKALI CELLULOSE AND VISCOSE. R. Schwarzkopf, 19, Taunusstrasse, Friedernau, Berlin. International Convention date, June 30, 1920.

Cellulose, *e.g.*, paper pulp or flakes, is agitated with caustic soda solution at a temperature above 180°C. for 20 minutes and the mixture then centrifuged to remove excess of caustic soda. Alkali cellulose is obtained and may be used for the manufacture of viscose.

165,747. ORGANIC ACID ANHYDRIDES. Dr. A. Wacker Ges. für Elektrochemische Industrie, 20, Prinzregentstrasse, Munich, F. Kaufler, and L. Hormann, Munich. International Convention date, June 30, 1920.

To produce organic acid anhydrides, an aromatic compound containing more than one halogen atom in the side chain, *e.g.*, benzal chloride or benzotrichloride is heated with the anhydrous alkali or alkaline earth salt of a carboxylic acid under increased or reduced pressure, and in the presence of a solvent such as xylene. Examples are given of the preparation of acetic anhydride from benzotrichloride and anhydrous sodium or calcium acetate, or benzal chloride or *p*-chlor-benzotrichloride and dry sodium acetate. Benzaldehyde is also produced as a by-product. In other examples, propionic anhydride is obtained from benzotrichloride and dry sodium propionate, and benzoic anhydride from benzotrichloride and dry sodium benzoate.

165,758. PHENOL-ALDEHYDE CONDENSATION PRODUCTS. L. Eilertsen, 132, Boulevard Magenta, Paris. International Convention date, July 2, 1920.

Phenol or a derivative is condensed with trioxymethylene or other solid body which liberates formaldehyde in the presence of a little alkali. Phosphoric anhydride is then added, and a salt such as sodium or potassium bisulphite which prevents oxidation. The product is hardened in aqueous hypophosphorous acid, sulphuric acid, hydrochloric acid, or a mixture of fuming sulphuric acid and crystalline acetic acid. The phosphoric anhydride is added to absorb water from subsequent additions, and other substances having this property may be used. When the acid anhydride is used, subsequent treatment with acid may be omitted. A light-coloured product may be obtained by adding amyl acetate or zinc sulphide to the initial materials.

165,759. PHOSPHORIC ACID. W. N. Hirschel and Amsterdamsche Superfosfaatfabriek, Utrecht, Holland. International Convention date, June 24, 1920.

Phosphate is treated in an ordinary superphosphate apparatus with sulphuric acid of 42°Bé strength, which contains sufficient water to hydrate the calcium sulphate. The mixture is then leached. Phosphoric acid of 30°Bé. is obtained.

165,761. DESULPHURIZING GASES. Fabwerke vorm. Meister, Lucius & Brüning, Hoechst-on-Main, Germany. International Convention date, July 2, 1920. Addition to 149,911.

Specification 149,911 (*see* THE CHEMICAL AGE, Vol. III., p. 568) describes a process for passing gases over finely divided porous carbon to desulphurize them. In this invention, the gas is dried before treatment, the carbon is dry, and the hydrogen or other gas used for regenerating the carbon is also dried before use.

165,767. ZINC OXIDE. New Jersey Zinc Co., 160, Front Street, Manhattan, New York. (Assignees of W. L. Coursen, Palmerton, Pa., U.S.A.) International Convention date, June 28, 1920.

Zinc is melted in a retort set in a regenerative gas furnace, a considerable body of zinc being always present in the retort. An inlet for producer gas is provided at one end of the retort, and an outlet for vapour at the other end. The zinc is vaporised and then burned. Fresh zinc is added continuously in small quantities through the gas inlet.

165,770. PERYLENE. A. Zinke, 30, Castellfeldgasse, Graz, Austria. International Convention date, July 2, 1920.

Dioxyperylene is distilled over zinc dust or heated with zinc or iron powder to yield perylene.

165,771. PERYLENE DERIVATIVES. A. Zinke, 30, Castellfeldgasse, Graz, Austria. International Convention date, July 2, 1920.

2 : 2′-dimethoxyl-1 : 1′-dinaphthyl or other alkyl derivative of 2 : 2′-dioxy-1 : 1′-dinaphthyl is heated with condensing agents, such as aluminium chloride to produce dioxyperylene. Perylenequinone may be produced by oxidation of the latter.

165,779. SYNTHETIC DRUGS. F. Hoffmann-La Roche & Co., Akt.-Ges., 184, Grenzacher Strasse, Basle, Switzerland. International Convention date, July 2, 1920.

1-allyl-3 : 7-dimethylxanthine is treated with two molecular parts of sodium salicylate, lithium benzoate, or sodium benzoate to produce soluble double compounds which are employed as drugs.

LATEST NOTIFICATIONS

168,023. Blast of cupola furnaces and blast furnaces. Gottschalk, M. August 14, 1920.
168,050. Alloys. Milliken, F. August 18, 1920.
168,054. Apparatus for condensing the mercury vapour in metal vapour rectifiers. Siemens-Schuckertwerke. August 19, 1920.
168,070. Method of further treating and granulating calcium cyanamide. Stockholms Superfosfat Fabriks Aktiebolag. August 21, 1920.

Specifications Accepted, with Date of Application

143,217. Distillation or evaporation, apparatus for. V. L. Emerson. May 8, 1919.
143,848. Hydrogenation of oils and fatty bodies, Catalytic process and apparatus for use in. Soc. Anon. l'Oxhydrique Francaise. May 28, 1919.
145,611. Cellulose and products manufactured therefrom, process for the treatment of. F. Moeller. February 24, 1919. Addition to 145,610.
147,044. Residual waters containing fatty and soapy matters, process for treating. Soc. Générale d'Evaporation Procédés Prache & Bouillon. March 9, 1914.
149,667. Acid chambers, acid mains, acid towers, and similar arrangements. P. L. Pfannenschmidt. July 31, 1919.
150,994. Lime, cement and like kilns. C. Candlot. September 10, 1919.
157,227. Camphylcarbinol, manufacture of. H. Rupe. June 2, 1916.
157,871. Electrodes for use in electrolysis. Chile Exploration Co. January 21, 1920.
167,540. Ammonium sulphides, manufacture of. South Metropolitan Gas Co., and P. Parrish. April 30, 1920.
167,555. Alum and sulphate of alumina, manufacture of. A. Matheson. May 6, 1920.
167,556. Water containing tarry matters, method of treating and filtering. W. Wade-Milton, W. Hepworth, and C. H. Fuessly. May 7, 1920.
167,582. Condensation reactions, process for effecting. A. V. Blom. May 11, 1920.
167,667. Caoutchouc and textile material from rubber fabric, process of and apparatus for recovering. R. Haddan. (*F. Waitz.*) July 9, 1920.
167,719. Ammonia from ammoniacal liquor, method and apparatus for the recovery of. W. C. Holmes & Co., Ltd., M. Boocock, and W. Wyld. January 6, 1921.
167,725-6. Sulphur dioxide from furnace gases or other gases containing the same. A. H. Eustis. May 4, 1920.

Applications for Patents

Ashby, W. T. Process of making margarine. (United States, August 24, 1920.) 22,498. August 24.
Badische Anilin- u. Soda-Fabrik & Johnson, J. Y. Manufacture of tanning preparations. 22,478. August 24.
Burke, C. R. Process of refining hydrocarbon oils. 22,238. August 22.
Davies, J. Laying of magnesium oxychloride cements on metallic surfaces. 22,436. August 24.
Faber, O. von. Process for recovering iodine. (Holland, August 28, 1920.) 22,404. August 23.
Foster, A. B. Process of treating hydrocarbon oils. 22,370. August 23.
General Electric Co., Ltd. Manufacture of tungsten. 22,381. August 23.
Hansford, J. B. Manufacture of neutral sulphate of ammonia. 22,645. August 26.
Harris, A. Cement-acid killer. 22,564. August 25.
Hart, A. M. Production of carbon. 22,460. August 24.
Hoover Co. Process of recovering aluminium chloride from spent or partly-spent catalyzing-agent. 22,270. August 22.
Macallum, A. D. Derivatives of *o*/nitro-phenylstibinic acid, and process of preparing same. 22,281. August 22.
Marks, E. C. R. (Hoover Co.) Process of recovering aluminium chloride from spent or partly-spent catalyzing-agent. 22,270. August 22.
Marks, E. C. R. Process of refining oil. 22,271. August 22.
Molassine Co., Ltd. Preparation of manurial products or nitrogenous fertilizers from leather, &c. 22,265. August 22.
Stockholms Superfosfat Fabriks Aktiebolag. Method of granulating cyanamide. (Sweden, August 21, 1920.) 22,272. August 22.
Verner, A. Process of covering aluminium with electrolytical deposit of nickel, cobalt, &c. 22,286. August 22.
Wallace, D. Desulphurizing oils and gases. 22,678. August 26.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

Market Report

THURSDAY, September 1, 1921.

A better flow of orders is reported during the past week, but buyers are still only purchasing against immediate requirements and the total turnover, whilst certainly on the up-grade, is still within small dimensions.

Export inquiry has perhaps been a little better.

General Chemicals

ACETONE remains in good demand. The price is unchanged.

ACID ACETIC is fairly healthy; steady business is passing and the price is firm.

ACID CITRIC continues to favour buyers.

ACID FORMIC has been in better demand and stocks are small.

ACID OXALIC.—A fairly active business is reported and the price is slightly on the up-grade.

ACID TARTARIC remains a weak and unsatisfactory market.

BARIUM CHLORIDE.—The price appears to have found its level, but only a small business is indicated.

BLEACHING POWDER has been in rather better inquiry for export, but there is plenty of room for further improvement in the demand.

FORMALDEHYDE is in steady demand and stocks are firmly held.

IRON SULPHATE remains unchanged.

LEAD ACETATE is lifeless and the trend of prices is in buyers' favour.

POTASSIUM CARBONATE is a stagnant market and a further fall in price is not unlikely.

POTASSIUM CAUSTIC.—The market is over-stocked and there is little movement.

CHLORATE POTASH is in good demand for export. The price has reached a very low level.

POTASSIUM PRUSSIATE is still in inquiry for export, but only comparatively small quantities are offered for early delivery.

SODIUM ACETATE is unchanged.

SODIUM BICHROMATE.—There is a steady absorption of second-hand parcels and the market is gradually becoming more healthy.

SODIUM CAUSTIC remains unchanged.

SODIUM HYPOSULPHITE is uninteresting.

SODIUM NITRITE.—A little better business is reported, but the price remains easy.

SODIUM PHOSPHATE is still a slow market.

SODIUM PRUSSIATE.—An improvement in price is not unlikely as certain of the makers have discontinued the manufacture for the time being.

SODIUM SULPHIDE.—There is a fair business of the hand-to-mouth variety without change in price.

Coal Tar Intermediates

There is little fresh to report, the demand remaining quiet. Stocks of some products on hand are very light.

ALPHA NAPHTHYLAMINE is without change.

ANILINE OIL AND SALT continue firm and there is a slightly better inquiry on export account.

BETA NAPHTHOL is featureless.

DIMETHYLAMINE is in small demand.

DINITROCHLORBENZOL.—There has been a better demand with prices firm.

DIPHENYLAMINE is steady with little business to report.

H. ACID has been in request and is inclined to be firmer.

PARANITRANILINE is only in small inquiry.

RESORCIN continues firm and scarce.

SALICYLIC ACID is higher and a further advance may be looked for.

Coal Tar Products

90's BENZOL is still scarce and the price for prompt delivery remains firm at about 3s. per gallon in London and 2s. 9d. to 2s. 10d. in the North.

PURE BENZOL is practically unobtainable, but as the demand is not great the price remains steady.

CREOSOTE OIL remains firm at 8¾d. to 9d. in the North and 9d. to 9¼d. in the South.

CRESYLIC ACID is inactive and although makers are endeavouring to secure slightly higher figures they do not appear to have been successful and little business has been done. Pale is worth from 2s. to 2s. 2d. on rails and dark from 1s. 10d. to 2s.

SOLVENT NAPHTHA is quoted at 2s. 6d. to 2s. 7d. on rails.

HEAVY NAPHTHA is not very strong and is quoted at 2s. 3d. to 2s. 4d.

NAPHTHALENE is inactive and is quoted at from £8 to £11 per ton for Crude qualities and £15 to £18 per ton for Refined qualities.

Pitch

The position remains unchanged and few transactions have been reported during the past week.

Makers remain firm in their idea of price of 80s. to 85s. per ton, f.o.b., U.K. port, but buyers do not appear inclined to cover their requirements at that figure.

Sulphate of Ammonia

There is an improved demand both for shipment during the remainder of this year and for shipment during the first few months of next year, and prices have an upward tendency.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	1	to	0	2	2
Acetone oil	ton	87	10	0	to	90	0	0
Acetone, pure	ton	90	0	0	to	95	0	0
Acid, Acetic, glacial, 99-100%	ton	60	10	0	to	62	10	0
Acetic, 80% pure	ton	47	0	0	to	49	0	0
Arsenic	ton	95	0	0	to	100	0	0
Boric, cryst	ton	65	0	0	to	68	0	0
Carbolic, cryst. 39-40%	lb.	0	0	6½	to	0	0	7
Citric	lb.	0	2	5	to	0	2	6
Formic, 80%	ton	65	0	0	to	67	10	0
Gallic, pure	lb.	0	4	0	to	0	4	3
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol.	ton	35	0	0	to	37	10	0
Lactic, 60 vol.	ton	40	0	0	to	42	10	0
Nitric, 80 Tw.	ton	38	0	0	to	40	0	0
Oxalic	lb.	0	0	8	to	0	0	8½
Phosphoric, 1.5	ton	50	0	0	to	53	0	0
Pyrogallic, cryst	lb.	0	7	6	to	0	7	9
Salicylic, Technical	lb.	0	1	0	to	0	1	2
Salicylic, B.P.	lb	0	1	5	to	0	1	6
Sulphuric, 92-93%	ton	8	0	0	to	8	10	0
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	1	4	to	0	1	5½
Alum, lump	ton	18	0	0	to	18	10	0
Alum, chrome	ton	37	10	0	to	40	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	12	0	0	to	13	0	0
Aluminium, sulphate, 17-18%	ton	15	0	0	to	16	0	0
Ammonia, anhydrous	lb.	0	2	0	to	0	2	2
Ammonia, .880	ton	43	0	0	to	45	0	0
Ammonia, .920	ton	30	0	0	to	32	10	0
Ammonia, carbonate	lb.	0	0	4	to		—	

	per	£	s.	d.		£	s.	d.
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	50	0	0	to	52	0	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	80	0	0	to	85	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	0
Amyl acetate	ton	150	0	0	to	160	0	0
Arsenic, white, powdered	ton	47	0	0	to	48	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	16	0	0	to	17	0	0
Nitrate	ton	50	0	0	to	52	0	0
Barium Sulphate, blanc fixe, dry	ton	28	0	0	to	30	0	0
Sulphate, blanc fixe, pulp	ton	16	0	0	to	16	10	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	0
Bleaching powder, 35-37%	ton	14	0	0	to		—	
Borax crystals	ton	31	0	0	to	32	0	0
Calcium acetate, Brown	ton	8	0	0	to	9	0	0
,, Grey	ton	10	0	0	to	11	0	0
Calcium Carbide	ton	27	0	0	to	28	0	0
Chloride	ton	12	10	0	to	13	0	0
Carbon bisulphide	ton	60	0	0	to	62	0	0
Casein, technical	ton	85	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	6	to	0	3	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	11	0	to	0	11	6
Oxide, black	lb.	0	16	0	to		—	
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	28	0	0	to	29	0	0
Cream Tartar, 98-100%	ton	125	0	0	to	130	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol.	ton	90	0	0	to	92	10	0
Formusol (Rongalite)	lb.	0	3	9	to	0	4	0
Glauber salts, commercial	ton	5	5	0	to	5	10	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	45	0	0	to	50	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	47	10	0	to	49	0	0
Carbonate (White Lead)	ton	43	0	0	to	46	0	0
Nitrate	ton	48	0	0	to	50	0	0
Litharge	ton	32	10	0	to	34	0	0
Lithopone, 30%	ton	27	0	0	to	29	0	0
Magnesium chloride	ton	14	0	0	to	15	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	10	10	0	to	11	10	0
Sulphate (Druggists')	ton	15	10	0	to	17	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	70	0	0	to	75	0	0
Methyl acetone	ton	85	0	0	to	90	0	0
Alcohol, 1% acetone	ton	120	0	0	to	125	0	0
Nickel sulphate, single salt	ton	65	0	0	to	66	0	0
Nickel ammonium sulphate, double salt	ton	67	0	0	to	68	0	0
Potash, Caustic	ton	29	0	0	to	29	10	0
Potassium bichromate	lb.	0	0	9	to		—	
Carbonate, 90%	ton	38	0	0	to	40	0	0
Chloride	ton	36	0	0	to	38	0	0
Chlorate	lb.	0	0	5	to	0	0	5½
Meta bisulphite, 50-52%	ton	120	0	0	to	125	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	1	2	to	0	1	4
Prussiate, red	lb.	0	2	0	to	0	2	1
Prussiate, yellow	lb.	0	1	2½	to	0	1	3
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt	3	5	0	to		—	
Seconds	cwt	3	0	0	to		—	
Sodium acetate	ton	25	0	0	to	26	0	0
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	6½	to	0	0	7
Bisulphite, 60-62%	ton	27	10	0	to	30	0	0
Chlorate	lb.	0	0	5½	to	0	0	5½
Caustic, 70%	ton	24	0	0	to	24	10	0
Caustic, 76%	ton	25	0	0	to	25	10	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	15	0	0	to	16	0	0
Nitrite, 96-98%	ton	40	0	0	to	42	0	0
Sodium Phosphate, crystal	ton	23	0	0	to	25	0	0
Perborate	lb.	0	1	8	to	0	1	9
Prussiate	lb.	0	0	6¾	to	0	0	7
Sulphide, crystals	ton	17	0	0	to	18	0	0
Sulphide, solid, 60-62%	ton	23	0	0	to	24	0	0
Sulphite, cryst.	ton	15	0	0	to	16	0	0
Strontium carbonate	ton	80	0	0	to	85	0	0
Strontium Nitrate	ton	84	0	0	to	90	0	0
Strontium Sulphate, white	ton	7	10	0	to	8	10	0
Sulphur chloride	ton	41	0	0	to	42	0	0

	per	£	s.	d.		£	s.	d.
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	5	to	0	1	6
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Tin Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride, 102 Tw.	ton	21	0	0	to	22	10	0
Chloride, solid, 96-98%	ton	59	0	0	to	55	0	0
Oxide, 99%	ton	40	0	0	to	42	0	0
Dust, 90%	ton	47	10	0	to	50	0	0
Sulphate	ton	21	10	0	to	22	10	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	3	6	to	0	3	9
Alphanaphthol, refined	lb.	0	4	0	to	0	4	3
Alphanaphthylamine	lb.	0	2	6	to	0	2	8
Aniline oil, drums extra	lb.	0	1	5	to	0	1	6
Aniline salts	lb.	0	1	6	to	0	1	7
Anthracene, 40-50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	4	3	to	0	4	6
Benzidine, base	lb.	0	6	0	to	0	6	6
Benzidine, sulphate	lb.	0	6	6	to	0	7	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzoate of soda	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	7	3	to	0	7	6
Betanaphthol	lb.	0	2	6	to	0	2	9
Betanaphthylamine, technical	lb.	0	9	6	to	0	10	0
Croceine Acid, 100% basis	lb	0	4	6	to	0	5	0
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	6	9	to	0	7	6
Dinitrobenzol	lb.	0	1	5	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	4	0	to	0	4	3
Diphenylamine	lb.	0	4	6	to	0	4	9
H-Acid	lb.	0	9	0	to	0	10	0
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	0	to	0	7	3
Monosulphonic Acid (2:7)	lb.	0	7	0	to	0	7	6
Naphthionic acid, crude	lb.	0	4	0	to	0	4	3
Naphthionate of Soda	lb.	0	4	3	to	0	4	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	9	to	0	5	0
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb.	0	1	3	to	0	1	4
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	3
Orthotoluidine	lb.	0	2	3	to	0	2	6
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	12	0	to	0	12	6
Para-amidophenol, hydrochlor	lb	0	12	6	to	0	13	0
Paradichlorbenzol	lb.	0	0	7	to	0	0	8
Paranitraniline	lb.	0	4	6	to	0	4	9
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	13	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	3	9	to	0	4	0
Resorcin, technical	lb.	0	4	0	to	0	4	6
Resorcin, pure	lb.	0	7	6	to	0	8	0
Salol	lb.	0	2	6	to	0	2	9
Sulphanilic acid, crude	lb.	0	1	4	to	0	1	6
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Stimulating the Demand for Rubber

THE 25 per cent. voluntary restriction of rubber output received very half-hearted support at Kalutara, according to a *Times* correspondent, who states that the consensus of local opinion favours the inauguration by the Rubber Growers' Association of a campaign to stimulate the demand for rubber. To this end it is suggested that the present financial resources of the Rubber Growers' Association should be very materially strengthened, so that it might be able to demonstrate from time to time in various ways the purposes for which rubber could be employed.

It is thought such a campaign would be bound to increase the demand in Kalutara and in India for the splendid range of rubber articles now manufactured on some of the local estates and create a demand for others which will be manufactured in course of time.

Chemical Trade Wages Dispute

Terms of Settlement Agreed

As exclusively announced in THE CHEMICAL AGE last week, meetings were held in Manchester which resulted on Friday in a withdrawal of the strike notices affecting about 30,000 workers in the chemical trades. It is understood that the terms of settlement will provide for a reduction of 1½d. from August 1, with another reduction of ½d. per hour from Oct. 1, as against 2d. per hour proposed in the first place by the employers. The settlement also provides for the stabilisation of wages until the end of the year.

In reference to the settlement, Mr. W. T. Kelly, secretary of the workers' side of the Joint Industrial Council for the Chemical and Salt Trades, states that following the intervention of the Labour Ministry, telegrams giving instructions as to the position were forwarded to all the districts concerned with the chemical trade, consequently there was no cessation of work. Arrangements are being made for a resumption of work in the case of those who had already come out.

A conference was held at the Crewe Arms Hotel, Crewe, on Monday afternoon, to deal with the situation in the salt trade, in which the men ceased work a fortnight ago. The employers' proposal was for a reduction of 1½d. per hour, with a further reduction of ½d. per hour in October. No decision was arrived at at this meeting, but the men's representatives agreed to lay the proposal before the general body of the workers.

On Tuesday evening the men agreed to resume work on Wednesday morning on terms which represented a modification of the wage reduction originally proposed. The basis of the settlement is a reduction forthwith of 1½d. per hour for day workers and 8¼ per cent. for piece workers, with further reductions of ½d. and 2¾ per cent. respectively in October.

Catalogues Received

A CATALOGUE received from Mr. H. T. Watson, of Fairfield Road, Widnes, illustrates the products of the Buckeye Dryer Co., Inc., of Columbus, Ohio, U.S.A., manufacturers of dryers for all classes of organic and inorganic materials. The company make six different types of dryers, and can supply each type in six different sizes. Copies of this catalogue may be obtained from Mr. Watson, who is sole British representative.

The British Aluminium Co., Ltd., of 109, Queen Victoria Street, London, E.C.4, send us a series of five booklets—"Hints on Working Aluminium." These booklets, which deal with aluminium ingots, sheet, circles, tubes and sections respectively, are uniform in size with their publication "Aluminium Facts and Figures" (*see* THE CHEMICAL AGE, Vol. V., p. 163).

The 1921 Boiler Catalogue, issued by Holdsworth & Sons, Ltd., of the Croft Boiler Works, Leeds Road, Bradford, describes and illustrates their manufactures, which include Yorkshire, Lancashire and Cornish boilers, Holdsworth's rapid circulator, the C.K. feed water diffuser, induced draught plant, patent air-tight dampers, draught gauges, &c. The catalogue also contains a section of useful notes for steam users and others. The firm, which incorporates the Yorkshire Boiler Co., Ltd., also sends a booklet on the Yorkshire boiler, in which this boiler is compared with the Lancashire type.

Herbert Morris, Ltd., of Loughborough, issue a 24 page illustrated booklet (Book 97), describing their hand overhead cranes of the single and double-girder types, wall and portable jib cranes, basement cranes and hand and electric overhead runways. Worm, spur and triple-gear pulley blocks are also shown.

Entitled "A Record of Industrial Enterprise," an interesting brochure is issued by the United Glass Bottle Manufacturers, Ltd., of 40–43, Norfolk Street, Strand, W.C.2. It describes the remarkable progress made since the end of 1918 by the amalgamation of old-established glass-bottle manufacturers which forms the present company, and tells how, in the short space of two years, this country has been able to produce the greater part of its own needs. The booklet contains numerous illustrations of the firm's modern works at Charlton, showing various portions of the plant, including the Owen's automatic bottle-making machines.

Spain's New Customs Duties

Effect on British Trade

MR. H. S. GARRATT, secretary of the British Chamber of Commerce in Spain (Rambla de los Estudio 8, 3°, Barcelona), writes: "On December 1 last some 131 items of the Spanish Customs tariff were considerably increased. At the time this measure was stated to be a temporary one in anticipation of the revision of the whole of the tariff. Subsequently a new tariff was put into force on May 21, being a revision of the whole of the Spanish Customs tariff, which became law on January 1, 1912. A translation into English of this revision, which constitutes the present Customs tariff, was published as a supplement to the *Board of Trade Journal* on May 26 last. In the *Madrid Gazette* of July 12 the projected complete new Spanish Customs tariff appeared. The old tariff consisted of 718 items, whereas the new one will consist of 1,425, the classification and numbering having been completely revised and changed. A version in English of this new draft Customs tariff can be obtained from H.M Stationery Office in London, price 6d.

"The Spanish Government has allowed until September 8 for the reception of petitions in writing from parties whose interests are affected by these proposals. After the expiry of this period the project will receive fresh revision, and will eventually be laid before the Spanish Cortes and become law at some future date. New commercial treaties will be negotiated on the basis of this tariff as finally approved. Having in view the short space of time now available for the presentation of petitions against the proposed new rates of duty, classification of merchandise, etc., this Chamber of Commerce urgently appeals to you to induce British manufacturers and exporters to give this matter their most prompt attention, in order that collective action may be taken to present a protest against the numerous exorbitant and unjustifiable increases proposed. Should these be carried into law, there is no doubt that they will greatly hamper, if they do not practically extinguish, the exportation of many articles from Great Britain to Spain.

"It is obvious that a protest of this kind, in order to be efficacious, should form the subject of a general note, to be presented to the Spanish Government, dealing with every item of the tariff in which it is felt that British traders are interested.

"In order, therefore, to secure the proper co-ordination of the representations that may be made by the different branches of British industry, it has been decided by the Board of Trade that the individual protests shall, in the first instance, be sent to the local Chamber of Commerce, which shall afterwards forward its joint protest to the Board. In order that the data may be as complete as possible, this Chamber of Commerce would suggest that firms should send in two lists of the cases in which they consider that the proposed new duties are unreasonably high and detrimental to trade between Great Britain and Spain; one list should show the selling price of their material or goods in pre-war times, plus the expenses of freights and former Spanish Customs charges, the whole to be calculated at the rate of exchange then current, which may be taken at 26 pesetas to the pound sterling. The other list should show the selling price to-day, plus the expenses of freight, Customs charges under the new proposals, and surcharge for payment in gold (which for the present month of August is 48·50 per cent.), reckoning the exchange at that current on the day of making the calculation. At the moment the exchange is 28·40 to the pound. The object in asking for this information is in order to be able to prove to the Spanish Tariff Committee, sitting in Madrid, how enormously costs will be increased to the Spanish buyer under the new rates of duty, as compared with those of the tariff of 1912.

"Finally, it should be pointed out that the duties on all the articles in which British exporters are principally interested have been enormously increased. Amongst them should be specially cited the following: Pig-iron, iron and steel bars, iron and steel plates, iron and steel polished bars, tinplate, iron and steel pipes, copper, bronze, and brass bars, machine tools and ingots, mineral colours, aniline, tanned leather, tallow and animal fats, steam generators, machinery, cranes, pumps, locomotives, &c. Many of these increases are so exorbitant and bereft of all reason that they practically amount to prohibition, and this fact should not be lost sight of in the framing of protests."

TRADE GUIDE

CHEMICAL AGE

Acid Resisting Metals

MONEL
Succeeds where other Metals fail.
Acid-resisting-Incorrodible
Bars, Rods, Sheets, Wire
Castings, Forgings.
G. & J. WEIR Ltd MONEL CATHCART, DEPT. GLASGOW.

Analytical Reagents

THE BRITISH DRUG HOUSES LIMITED BDH LONDON
Research Chemicals
THE BRITISH DRUG HOUSES, LTD.,
Graham St., City Rd., LONDON, N.

Asbestos

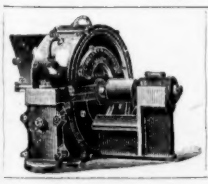
Pioneers of the World's Asbestos Industry
BELL'S UNITED ASBESTOS Co., Ltd.
Southwark Street, LONDON, S.E.1
(Established 1871)

Balances

Oertling
LONDON

Chemical Plant

BENNETT SONS & SHEARS, Ld.
43, SHOE LANE,
LONDON, E.C.4.



CHRISTY & NORRIS, CHELMSFORD LTD. (England),
Specialise in
GRINDING MACHINERY FOR ALL MATERIALS
Send for Catalogue, *State Requirements.*

THE Trade Guide is a compact and handy form of reference to a representative list of firms engaged in various branches of the Industry. In most cases fuller particulars may be found by referring to the displayed advertisement elsewhere.

Chemical Plant (*Continued*)

Centrifuges
Autoclaves
Sterilizers, etc.
CHARLES HEARSON & Co., Ltd.
WILLOW WALK, BERMONDSEY, S.E.

Carbons

NORIT.
THE decolorising carbon and Refining Agent.
30 Times adsorptive capacity of bone char.
In five grades.
JOSEPH BAKER SONS & PERKINS LTD.,
Head Offices: KINGSWAY HOUSE, KINGSWAY, W.C.2
Telegrams: "Bakers, London."

Disinfectants

ALL GRADES, PERCENTAGES AND CO-EFFICIENTS
ALSO
LIQUID SOAPS
W. GARDINER & CO.
83, Broad Street, Camlachie, Glasgow

Drums and Tins

JOHN FEAVER,
TOWER BRIDGE ROAD, S.E. 1.
TINS for
PRESERVED PROVISIONS and FOODSTUFFS.
CANS for VARNISH, PAINT.
DRUMS & TAPERS for OILS, VARNISH.
Samples and Prices on application.

Essential Oils

VIOFLOR REG.
Covers Objectionable Smells in Manufacture of White Spirit Turpentine Substitutes, etc.
CREPIN & DOUMIN, Ltd.
15, COOPERS ROW, E.C.3

Evaporators

KESTNER PATENT
EVAPORATORS
ACID ELEVATORS
FANS
EXTRACTORS
CRYSTALLIZERS
Kestner Evaporator & Engineering Co. Ltd
5 Grosvenor Gardens, Westminster, S.W.1.

MULTIPLEX AND SIMPLEX FILM EVAPORATORS.
DISTILLING PLANT.
DRYING PLANT OIL HARDENING PLANT.
BLAIR CAMPBELL & McLEAN Ltd GLASGOW
MAKERS OF ALL TYPES OF CHEMICAL PLANT

Filterpresses

P.F.C. THE RESULT OF 60 YEARS EXPERIENCE
PREMIER FILTERPRESS Co. LTD.
FINSBURY PAVEMENT HOUSE, LONDON, E.C.2

S. H. JOHNSON & CO., LTD.
CARPENTERS ROAD, STRATFORD, E. 15.
FILTER PRESSES

Furnaces

Cut your Fuel Costs
By adopting Wilton's (1920 Pat.) Furnaces
Oil Burners can be fitted
Write for Booklet
Chemical Eng. & Wilton's Pat. Furnace Co. Ltd.
Dept. C.A.F. 76, Victoria St., London, S.W.1. Victoria 2417

Chemical Trade Inquiries

"The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Locality of Firm or Agent	Materials.	Ref. No.
Australia ...	Glassware. Replies should be addressed to the Official Secretary, Commonwealth of Australia, Commercial Information Bureau, Australia House, London, W.C. 2, quoting reference number 412/20/729.	—
Montreal ...	Soaps	174
Johannesburg	Creosote. Replies to the Department of Overseas Trade, 35, Old Queen Street, London, S.W. 1.	—
Antwerp ...	Drugs; scientific glassware ...	—
Zurich ...	Jute	181
Netherlands East Indies	Paint; chemicals; white zinc; carbonic acid; white zinc in oil; liquid ammonia; mineral white lead; iron chloride; collodion; phosphor tin; linseed oil. Replies to the Enquiry Room, Dept. of Overseas Trade, 35, Old Queen Street, London, S.W. 1.	—

Tariff Changes

CANADA.—The Board of Trade have received a cable from H.M. Senior Trade Commissioner in Montreal, in which he states that the operation of the provisions of the Act relating to the marking and stamping of imported goods has been postponed until December 31.

GRENADA.—A new Customs Ordinance provides that, for the purpose of assessing *ad valorem* Customs duties on goods imported into the colony, the invoice value of the goods shall be converted into British currency at the market rate of exchange on the day on which the duty is paid, or on the day of arrival of the importing ship. It also provides that no invoice for goods purchased in a foreign country shall be accepted by the Customs Authorities unless the value of the goods is expressed in the currency of the country from which thes invoice is supplied.

MESOPOTAMIA.—The general *ad valorem* duty of 11 per cent. is now increased to 15 per cent. *ad valorem*, but the duty on coal, coke and charcoal, dyes and dyeing materials (unmanufactured), guns and resins, pitch, tar and dammar, seed and soda, tallow and stearine, tanning materials (unmanufactured), including galls, salt and all unmanufactured articles not specially mentioned in the Tariff, remains at 11 per cent.

SIERRA LEONE.—The general *ad valorem* duty leviable on goods imported into Sierra Leone is raised from 20 to 25 per cent.

ESTHONIA.—The export of soap of all kinds, calcined washing soda and caseine is free of export tax. The export duty on crystallised washing soda is fixed at 60 Esthonian marks per pood (gross).

HUNGARY.—A licence is required for the importation of rapeseed oil; hard rubber; fittings for technical purposes, for instruments, &c., of hard rubber; nickel anodes; potash; glycerine, raw or refined; prepared blocks; glue of all kinds; lac varnishes; and candles of stearine or paraffin wax. As from June 19, the export duty on vegetable fatty oils is fixed at 50 kronen per kilog. (net).

ITALY.—Mineral oils (except petrol and petroleum), oleaginous seeds and nut oil, and oleine may be exported without the requirement of an export licence.

LATVIA.—The Government linseed monopoly has been abolished, and free trade in that commodity is now permitted.

MARTINIQUE.—The Customs duty on the import of perfumery is now leviable at double the rates previously in force.

MEXICO.—The import duty on crude mineral oil; sulphuric acid; detonators; dynamite; blasting powder, &c., and fuses for mines, has been re-imposed as from August 1.

NORWAY.—The prohibition on the exportation of cellulose and mechanical wood pulp; cyanamide; nitrate of lime and superphosphates, has been withdrawn as from July 30.

PORTUGAL.—Carbon sulphuret is exempt from export surtaxes when exported to any destination.

ROUMANIA.—Sulphuric ether, acetic ether; amyl alcohol, amyl acetate; crude sulphuric acid; glucose; and soda (calcined or crystallised) are now exempt from export tax.

UNITED KINGDOM.—The Board of Customs and Excise announce that the heading "Soy, when containing molasses or other sweetening matter" in the Customs and Excise Tariff (page 13 of issue dated November 1, 1920) will be cancelled as from September 1, and consignments of Soy imported on and after that date will be charged with duty as molasses at the rate appropriate to the percentage of sweetening matter contained in the article.

Company News

JOHN OAKEY & SONS.—The directors have decided not to pay an interim dividend on the ordinary shares.

LINOLEUM MANUFACTURING CO.—An interim dividend of 2s. 6d. per share, free of tax, and payable on September 30, is announced.

BRITISH GLASS INDUSTRIES.—The secretary announces that the accounts are now in readiness and a meeting will be called for a date towards the middle or end of September.

GOODLASS, WALL & CO.—The directors announce a dividend of 10 per cent., less tax, on the ordinary shares for the year to June 30 last. Warrants were posted on Thursday.

DOMINION GLASS.—The directors announce an interim dividend of 1½ per cent., less tax, on the common stock, payable on October 1. Last year an interim dividend of 1 per cent. was paid.

ENGLISH CHINA CLAY, LTD.—In order to conserve the Company's financial position as far as possible, the directors have decided that it is desirable not to declare an interim dividend on the preference shares.

ZINC CORPORATION.—The directors announce a dividend of 2s. per share on the preference shares, being the second half of the fixed preferential dividend of 20 per cent. for the year 1920, payable on October 14, less tax. The transfer books will be closed for one day, September 14.

LAWES' CHEMICAL MANURE CO.—The directors regret their inability to present the accounts in the customary form, pending a settlement with the authorities of questions arising out of taxation. The shareholders will be asked to adjourn the meeting until a later date, of which due notice will be given, when the accounts for the year will be presented. After the ordinary meeting an extraordinary general meeting is to be held for the purpose of considering, and, if thought fit, passing the following resolution: "That each of the 25,193 ordinary shares of £10 each issued and fully paid and each of the 4,807 unissued ordinary shares of £10 each be divided into 10 ordinary shares of £1 each and that each of the 7,675 7 per cent. preference shares of £10 each issued and fully paid and each of the 2,325 unissued 7 per cent. preference shares of £10 each be divided into 10 preference shares of £1 each." Meeting, Great Eastern Hotel, Liverpool Street, E.C., September 8, noon.

Valves for Gas Bottles and Cylinders

DURING the war many took more than a passing interest in the poison-gas cylinders which the Gas Section, R.E.'s, were seen to handle so carefully. One of the vital parts of those cylinders was the valve, and many were made by David Scott, at the Cathkin Engineering Works, Polmadie, Glasgow. In these valves were embodied the results of 30 years' experience in making valves for gas bottles and cylinders, and what proved efficient for poison gas has been equally efficient for gases for industrial uses. All manufacturers and users of gases know the need of an efficient valve to their bottles, which will stand constant use. Thus it is that good workmanship and good service have created a wide demand for the valves made by this firm.

TRADE GUIDE

CHEMICAL AGE

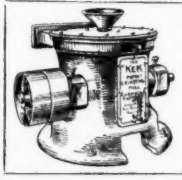
General Chemicals

CHEMICALS, FERTILISERS
TAR & AMMONIA PRODUCTS
CHAS. PAGE & Co, LTD.
47-51, KING WILLIAM St LONDON, E.C.

Glassware

SCIENTIFIC GLASS WARE
DURO GLASS R LONDON
40/43 NORFOLK St, STRAND, W.C.2

Grinding Mills



"KEK"
Patent GRINDING MILL for Chemicals, Colours, Dyes, Minerals, etc.
Sole Makers & Patentees:
The Chemical Engineering Co (M/cr) Ltd.,
49, Deansgate, Manchester.

Heavy Chemicals

ULTRAMARINE BLUE
HAMILTON SON & Co.
IRONIA CHEMICAL WORKS
LILYBANK RD.
GLASGOW
RED LEAD ETC.

THE Trade Guide will undoubtedly be found of great assistance by buyers; should any information be required which cannot be found herein a request to the "Chemical Age" Business Manager will bring a ready response.

Instruments

BRISTOL'S
RECORDING
GAUGES & THERMOMETERS
J.W. & C. J. PHILLIPS, LTD.
23, College Hill, London, E.C.4

Oil and Fuel

ANGLO'S FUEL OIL
For
Steam Raising: Diesel & Semi Diesel Engines &c.
ANGLO AMERICAN OIL Co. LTD

Oil and Fuel—(*Continued*)

BRITISH OIL & FUEL CONSERVATION, LTD.
FREEMAN MULTIPLE RETORT.
FREEMAN PRECISION TEMPERATURE CONTROL.
Telephone:— Museum 6468.
9, SOUTHAMPTON ST., HOLBORN, W.C.1.

Phosphates

Bone Ash
Purest and Finest
Highest Percentage of Tricalcic Phosphate
Pure Bone Phosphate & Chemical Co. Ltd
27, Kirkgate, Newark

Steam Fittings

1855 CRANE 1921
Everything for any Pipe Line
CRANE-BENNETT LTD.
45/51, Lena St., London, E.1.
Branches:
MANCHESTER, BIRMINGHAM, LEEDS, GLASGOW.
Works: IPSWICH.

Sulphur

PRICE, STUTFIELD & CO., LTD.,
6, FENCHURCH BUILDINGS,
LONDON, E.C.3.
Sublimed Flowers.
Commercial Flowers. Fine Ground.
Refined Roll. Refined Rock.
Rough—99/99·5% American.

Committee on Lead Paints

THE Home Secretary has appointed a Committee to re-examine, more particularly in the light of the further information which has become available since the inquiries of the Departmental Committees appointed in 1911, the question of the danger from the use of lead paints to workers in the painting trades, and the comparative efficiency and cost, and the effect on the health of the workers, of paints containing lead and leadless paints respectively. The Committee will also advise whether any modification of the conclusions and recommendations of those Committees have become necessary. The Committe consists of Sir Henry Norman, Bt., M.P. (chairman), Mr. Gerald Bellhouse, C.B.E., Mr. O. J. Kauffmann, M.D., Mr. Thomas M. Legge, C.B.E., M.D., Mr. Alan Munby, Mr. Alexander Scott, F.R.S., D.Sc., and Mr. H. C. Weller. The secretary of the Committee is Mr. C. W. Price, of the Home Office, Whitehall, S.W. 1, to whom any communications on the subject should be addressed.

Increased Canadian Dye Imports

THE monthly report of the trade of Canada for April gives the value of imports of dyes and tanning materials as follows: From Great Britain, $18,742; United States, $129,220; other countries, $64,548; total, $212,519, as compared with imports from Great Britain, $37,922; United States, $356,608; other countries, $3,331; total, $397,861 for April, 1920. Aniline and coal tar dyes, included in the above, were imported as follows: Great Britain, 21,430 lb.; United States, 57,627 lb.; Germany, 11,600 lb.; Switzerland, 10,560 lb.; other countries, 220 lb.; total, 101,437 lb. The figures for April, 1920, were: Great Britain, 45,821 lb.; United States, 182,000 lb.; total, 227,821 lb. Fertilisers were imported to the total value of $335,509, of which $1,792 was from Great Britain, $211,129 from the United States, and $122,588 from other countries, as compared with total imports for April, 1920, valued at $397,575, of which $24,194 was from Great Britain, $323,325 from the United States, and $50,056 from other countries.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Bankruptcy Information

FULFORD, ARTHUR, 52, Wadborough Road, carrying on business as A. Fulford & Co. at 71, Bowdon Street, in Sheffield, wholesale druggist. First meeting, September 2, 11.30 a.m. Official Receiver's offices, Figtree Lane, Sheffield. Public examination, October 6, 2.30 p.m., County Court Hall, Bank Street, Sheffield.

Notices of Intended Dividend

CONNELL, ROWLAND WILLIAM, JUNR., 33, Hanover Street, Liverpool, artificial manure manufacturer. Last day for receiving proofs, September 14. Trustee, Elwy Davies Symond, Official Receiver, 11, Dale Street, Liverpool.

ROBINSON, WILSON (separate estate), The Woodman Inn, Hartley Street, Dewsbury, carrying on business together in co-partnership with Tom Robinson and James Wightman, under the style or firm of Wilson Robinson & Son, at the Albion Dye Works, Batley Carr, Batley, York, dyer. Amount per £, 5s. 2¾d., first and final, payable September 1, Official Receiver's office, 12, Duke Street, Bradford.

Company Winding-up Voluntarily

OIL EXTRACTORS, LTD. Thomas Whiteley, 50, Pall Mall, London, S.W.1, appointed liquidator.

Liquidator's Notices

CRESOL CHEMICALS, LTD. (in voluntary liquidation). General meeting of company at the office of the liquidator, 26, Pall Mall, Manchester, Friday, September 30, 3.30 p.m., to receive report of winding-up. T. Smethurst, liquidator.

MORGAN & CO. (MAESTEG) CHEMISTS, LTD. (in voluntary liquidation). General meeting of company, September 28, 10 a.m., at 16, Commercial Street, Maesteg, Co. Glamorgan, to receive report of winding-up.

MALAGA RED OXIDE COMPANY, LTD. (in voluntary liquidation). General meeting of company at the registered offices, Wick, Gloucestershire, on Thursday, October 6, 1921, at 10 a.m., to receive report of winding-up.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C.2 :—

ASIATIC PETROLEUM COMPANY (BALTIC STATES), LTD. Producing, refining and distributing petroleum and other oils. Nominal capital, £1,000 in 100 shares of £10 each. Directors to be appointed by subscribers. Subscribers: J. C. Nylis, F. Plummer.

BURLINGTON INDUSTRIAL LABORATORIES, LTD. Analytical, consulting and manufacturing chemists. Nominal capital, £1,000 in 1,000 shares of £1 each. Directors: F. Goddard, H. Elliott. Qualification of directors: £50.

ROBERTS (BARKING), LTD. Creekmouth, Barking, Essex. Manufacturers and dealers in inks, paints, varnishes, oils and colours. Nominal capital, £100 in 100 shares of £1 each. Directors: R. W. Orrock, W. P. Orrock, E. Clarke. Qualification of directors: £2.

TIMMIS & INGHAM, LTD., 102, High Road, Ilford. Chemical manufacturers and dealers. Nominal capital, £4,000 in 4,000 shares of £1 each. Directors: G. Ingham, C. H. Cooper (permanent directors). Remuneration of directors: £312 per annum each.

Recent Wills

Mr. R. B. Turner, of Lancaster Street, Hyde Park, and of Messrs. R. B. Turner & Co., chemical and laboratory glassware importers, Eagle Street, London, W. £20,117

Mr. C. J. Palmer, of Leigh-on-Sea, Essex, director of Spies Petroleum, Ltd. £15,404

Austrian Imports and Exports of Chemicals

IN his Report on the Industrial and Commercial Situation in Austria [H.M. Stationery Office, 1s. 6d. net] Mr. O. S. Phillpotts, Commercial Secretary to H.M. Legation, Vienna, reviewing the mineral resources of Austria, states that magnesite deposits in the provinces of Styria and Carinthia yielded in 1913 about 220 000 tons, the greater part of which was exported to Germany, France, Italy, United States of America and the United Kingdom. French, American, German and Italian capital is interested in some of the undertakings; the export has been resumed to some degree, but the production is suffering from shortage of coal.

The salt deposits in the neighbourhood of Salzburg and in the Tyrol yielded before the war about 160,000 tons per annum, of which one half would be available for export. The finished salt is obtained by boiling brine; here again the lack of coal prevents more than 40 per cent. of the peace figure being produced at present.

In regard to mineral oil he states that the oilfields of Galicia which belonged to the former Empire are now part of Poland, and Austria must import all the liquid fuel it requires from abroad. The consumption in peace time is estimated at about 200,000 tons, including 48,000 tons of benzine. Owing to transport difficulties and political and economic troubles it has been possible to obtain only a small part of the country's requirements from Galicia and Roumania, the nearest sources of supply, and some has been imported from overseas, though not nearly enough to supply the deficiency. It has therefore been impossible to make up for the shortage of coal by an increased import of oil. There are three refineries in the country together capable of dealing with about 8,000 tons monthly, but these have had only small supplies of crude oil. Some works are being constructed in the Tyrol for the extraction of oil from shale, and it is hoped that these will begin production in the summer of 1921. The Galician oil companies are coming under the control of foreign capital, largely French, and their central offices, which are in Vienna, may in time all be removed abroad.

The most important imports from the United Kingdom have included antimony, tin, nickel, and certain chemical products, including borax, chromate of potash and alum. Magnesite is practically the only raw material which the United Kingdom receives from Austria, the 1920 imports of burnt magnesite approximating 3,000 tons.

From a detailed table giving the Austrian imports and exports in 1920 we find that fats and grease were imported to the extent of 62,164 tons, of which the United Kingdom supplied 3,327 tons; fatty oils, 5,410 tons (U.K. 11); minerals, 101,666 (29); dyeing and tanning materials, 5,030 (16); gums and resins, 8,767 (108); mineral oils, slate tar and brown coal tar, 79,899 (826); and chemicals and chemical products, 71,349 (378).

Of the Austrian exports, the United Kingdom received seven tons out of a total of 45,460. Other exports were dyeing and tanning materials, 4,169 tons; gums and resins, 1,420, and explosives, 6,269 tons.

New Carbonising Plant at Willesden

BRITISH OIL & FUEL CONSERVATION, LTD., of 9, Southampton Street, Holborn, London, W.C.1, announce that they have taken over a large works at Willesden, where they are erecting laboratories, retorts and distilling apparatus, to demonstrate their unique plant for the complete low and high-temperature treatment of coals, shales and lignites under the direction of their technical director and patentee, Mr. N. H. Freeman. Their laboratories and retorts are now available for testing material from British, Colonial and foreign sources. They state that accurate and reliable data will be given as to the maximum yield of oil, the value of the distillates and residues and the cost of operation. Moreover, a certificate of analyses and complete reports upon the best method of treatment to secure a maximum economic return will be issued. A Freeman multiple low-temperature retort is being erected capable of treating 10 tons of material per day and owners of coal, lignite and shale are notified that the company is now in a position to accept orders for ten ton tests.

THE DOMINION OXYGEN CO., LTD., of Toronto, propose to erect a plant in Montreal which will double the company's productive capacity.